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The University of Nebraska-Lincoln College of Agriculture: The First Century Part V. Departments, Quasi-Departments, and Liaison with Administrative Units Outside of the College/IANR

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Part V. Departments, Quasi-Departments, and Liaison with Administrative Units Outside of the College/IANR

Contents

When we look at the wonderful progress made in agricultural production it is difficult to determine how much each discipline has contributed to the total. Progress is illustrated by the fact that corn yields in Nebraska have quadrupled since 1949. Who gets the credit? Major contributions have been made by agronomists, biochemists, engineers, entomologists, plant pathologists, and others, both by those in the IANR and elsewhere in the U.S. and abroad. Irrigation has been a major factor. Extension specialists and county extension agents, as well as the private sector through research, education and marketing of superior seed, chemicals, fertilizers, equipment and other production inputs have all been involved in the progress made. The contributions made by individual farmers who have brought all of these inputs together to grow, harvest, and market the crop are equally important. A similar story can be related for livestock. To "divide the pie" with respect to allocating credit for the progress made is extremely difficult. The reader should keep this complicated picture in mind as he/she reads the accomplishments of the individual departments and centers and other segments of the IANR.

With the station/extension grid system of scientists located on the East Campus and at the off-campus centers, and with most of the scientists, regardless of location, having departmental appointments, it has not been easy to determine what work should be reported in the departmental chapters and which portions in the chapters on the research/extension centers. Limited duplication has been necessary to round out some of the topics treated in the departmental chapters, but for the most part we have attempted to limit reporting of work to where it was done.

Chapter 1. Agricultural Biochemistry[1]

Contents

Names of the Department

Agricultural Chemistry[2]	1902-1953	Laboratory of Agricultural Biochemistry (Station only)	1973-1980
Biochemistry and Nutrition	1953-1973	Agricultural Biochemistry	1980-present

Administrators

Name	Title	Period served
Hudson H. Nicholson[3]	Chairman of Chemistry and Station Chemist	1902-1904
Samuel Avery	Chairman of Chemistry and Station Chemist	1905-1908
F. J. Alway	Head, Agricultural Chemistry	1909-1913
F. W. Upson	Head, Agricultural Chemistry	1913-1919
F. W. Upson	Chairman, Agricultrual Chemistry	1919-1927
Morris J. "Tony" Blish	Chairman of Department	1927-1939
Clifton W. Ackerson	Acting Chairman	1939-1941
Rudolph M. Sandstedt	Acting Chairman[4]	1942-1945
Clifton W. Ackerson	Acting Chairman	1945-1947
Clifton W. Ackerson	Chairman	1948-1953
Robert E. Feeney	Chairman	1953-1960
John H. Pazur	Chairman	1960-1966
Raymond L. Borchers	Chairman	1966-1973
Raymond L. Borchers	Head of Laboratory	1973-1975
Herman W. Knoche	Head of Laboratory	1975-1980
Herman W. Knoche	Head of Department	1980-present

Location on Campus

Years	Names of Buildings
1896-1899	Old stone house (on what is now the East Campus)
1899-1957	Ag Experiment Station Building[5]
1957-present	Biochemistry & Nutrition (renamed Agricultural Biochemistry in 1980).

[1]The authors acknowledge the assistance of Herman W. Knoche and Robert M. Hill in providing material for this chapter.

[2]The 16th annual Station report dated January 31, 1903, p 9, stated, "The Department of Agricultural Chemistry has been made an independent department, being separated from the Dept. of Chemistry."

[3]Hudson H. Nicholson was a staff member of the University for almost a quarter of a century (1, p 91), most of this time pre-dating the establishment of Agricultural Chemistry as a Department, independent of Chemistry.

[4]Sandstedt served as acting chairman, while Ackerson was on military duty during WW II.

[5]Renamed "Experiment Station Hall" in 1900, "Agricultural Chemistry" in 1951 (5), "Department of Information" in 1960, and "Agricultural Communications Building" in 1973 (6, 7).

Resident Instruction

1869-1875

The Legislative Act of 1869 creating the University of Nebraska provided for six colleges, one of which was the College of Agriculture (2, p 16). One of the six chairs in the College was to be that of "applied chemistry". According to the first University announcement (1871)[6], even before the College of Agriculture was established, it was stated ". . . it is designed to have a course of lectures on agricultural chemistry at some time during the year", to be taught by Samuel Aughey who had recently been assigned to the chair of applied chemistry (agricultural) in addition to his duties as professor of natural sciences (2, p 35). Whether or not Aughey gave any lectures on agricultural chemistry that first year is not known.

The Board of Regents established the College of Agriculture on June 25, 1872, with Samuel R. Thompson being elected to the "chair of agriculture" effective that fall. No regular students enrolled in the College until the fall of 1874 (3). In spite of this, Thompson (1, p 21) said that his lectures on agricultural chemistry were very well attended during the 1872-73 school year — just who the attendees were was not reported.

The above actions and reports establish the fact that agricultural chemistry predates the start of the College of Agriculture at the University of Nebraska.

In spite of its very early start, instruction in agricultural chemistry per se, appears to have disappeared from the curriculum by the fall of 1874. The College catalog for the 1874-75 school year listed the following courses in chemistry: organic, analytical, and physical (chemical physics) — but no agricultural chemistry. In the years that followed, inclusion of courses in agricultural chemistry was rather sporadic[7].

1876-1923

In the fall of 1876, Gilbert E. Bailey was a tutor in analytical and agricultural biochemistry (2, p 57). In 1891, the Board of Regents appointed "T. Lyttleton Lyon, BS, 1891, Cornell, instructor in agricultural chemistry" (1, p 90). In 1903, Samuel Avery was listed in the University bulletin as teaching a course in analysis of agricultural products (1, p 90).

In the early College of Agriculture Bulletins (4), courses taught by staff within and outside of the College were both included in one integrated listing. In 1920-21 one of the courses taught by chemistry was animal nutrition. In the following year courses under this title were being offered by the staff in both chemistry and animal husbandry; however, by 1922-23, the course had been dropped from chemistry.

[6]The year the University first opened its doors to students.

[7]It should be noted that over the years, some attention was given to agriculture in various chemistry courses even though not specifically listed as such.

1923-1962

Two courses were listed for the first time in the 1923-24 College bulletin: "wheat flour chemistry", and "research in agricultural chemistry". The courses were listed under chemistry section and were taught by Blish. The following year a course "analysis of agricultural products" was added (also taught by Blish). Ackerson[8] started participating in teaching the above courses in 1937-38 and Sandstedt in 1938-39. Blish also taught a proteins course in 1930-31 (4).

All agricultural chemistry courses had disappeared from the College of Agriculture Bulletin by 1950-51[9]. In 1956-57, instruction in agricultural chemistry reappeared in the College of Agriculture Bulletin with Borchers being listed as teaching "agricultural food chemistry", "Wheat and flour chemistry" and "analysis of agricultural products" reappeared in the 1959-60 College of Agriculture Bulletin, all three courses continuing to be listed under chemistry. In 1962, a course entitled "radioisotopes methods" was taught by Robert M. Hill, Pazur and Robert A. Olson, the course being cross listed in the Departments of Chemistry and Agronomy (4).

1963 and After

In 1963-64, Biochemistry and Nutrition, a Department in the College of Agriculture, appeared for the first time in the College Bulletin with a list of 10 courses (4). Thus, after 10 years of concerted effort, first by Feeney and then Pazur and their colleagues, the staff succeeded in getting biochemistry and nutrition approved as a teaching department. (See Part III, Chapter 1).

In 1973 the teaching functions of the Department were transferred to the School of Life Sciences in the College of Arts and Sciences. In 1980, the action was reversed, once again, with the 1980-82 College of Agriculture Bulletin carrying Agricultural Biochemistry as a teaching department. In the 1986 Bulletin, there were 26 courses listed and cross listed in the Department of Agricultural Biochemistry (12). However, the authority to grant master's and doctorate degrees, held by the Department in 1973, was not restored. Students taking their principal work in the Department today (1987) obtain those degrees in the School of Biological Sciences (4). Including degrees granted through other departments, the Department of Agricultural Biochemistry had awarded 34 MS and 31 PhD degrees by 1984.

[8]Ackerson taught biochemistry in the chemistry department from 1928-29 until 1934-35, at which time the course was taken over by Walter Militzer.

[9]In 1954-55 Borchers began teaching organic chemistry on East Campus and Ackerson, Feeney and Pazur took over analysis of agricultural products, all courses being taught in the College of Arts and Sciences. In 1957 analysis of agricultural products was taught by Hill and Feeney.

Research

The aim of biochemical research has been to better understand the chemical composition, mechanisms and control of plant and animal systems. As instrumentation and techniques improved over the years the biochemist has also changed the level of his research from studying the response of the entire plant or animal, to investigation of the organs, and finally at present to investigation of cell constituents. Finding an answer to each question at each stage raises more questions to be answered and more problems to be studied.

Prior to 1889

There appears to have been little research in the College of Agriculture which could be classified under the discipline of chemistry prior to the establishment of the Station in 1887. None of the five "Press Bulletins" issued in 1885 (1, p 51) nor the first 11 Station bulletins published between 1888 and 1889 could be classified under the subject of chemistry. Referring to experimental work done in the College prior to 1887, Crawford stated: "Steps had been taken toward making chemical and physical analyses of soils" (1, p 52). Such work at the time would likely have been done by chemists and physicists.

1889-1921

On February 4, 1889, Hudson H. Nicholson, station chemist, reported he was carrying on investigations on the soils and waters of the state. The following year he added "growth of sugar beets" to his research program. Gradually, the Station chemistry section shifted more and more of its emphasis to sugar beets. Also in the Station report dated December 19, 1892, it was stated that analyses were made not only in connection with research by the chemists but also on ". . . sugars, fertilizers and cheeses for the 'reporters of the Association of Official Agricultural Chemists' ".

By 1896, it was apparent from the Station report that Nicholson was doing his sugar beet research in cooperation with T. L. Lyon. Nicholson was also making various types of analyses. He gradually increased his fields of research/analyses so that by 1899 he reported on work in these areas: sugar beets, soils, seeds, cattle foods, forage crops and grain crops (8).

When the 16th annual Station report was issued on January 31, 1903, Nicholson had been replaced by Samuel Avery as station chemist. Little was reported in the way of chemistry research in the Station annual reports during Avery's four years as station chemist (8).

During the time that F. J. Alway was head of the Department (1909-13), the emphasis was on soils, including work on commercial fertilizers. In September 1912, he read a paper on loess soils at the International Congress of Applied Chemistry (8).

In 1913, Alway resigned and was succeeded by F. W. Upson. Once again there was no great amount of research work in agricultural chemistry, although the topics under study were reported as including soils and silage (8).

1922 to 1952

The appointment of Morris J. "Tony" Blish by the Board on August 1, 1921 (13) was a move which was to have a significant influence on the research of the Department for many years to come. Blish was an outstanding scientist and a strong leader. He was in charge of research on milling and baking qualities of wheat to assist the wheat growers of the state. Rudolph M. Sandstedt who had been hired as "analyst" in agricultural chemistry in 1920, gradually became involved in the same project. Beginning in the 1930's emphasis was placed on studies on starch in grains. Blish left the University in October 1939 to become chief of the protein division of the USDA Western Regional Research Laboratory at Albany, California. Meanwhile, Sandstedt continued the cereal research, in which he was joined by Paul J. Mattern in 1953. Mattern transferred to the agronomy department in 1959 to establish and conduct a wheat quality laboratory as a part of the large wheat improvement project in that Department, while Sandstedt continued the cereal starch research in the Department of Biochemistry and Nutrition.

Beginning in 1950 considerable effort was directed to studies of carbohydrate mechanism and on the physical and chemical properties of proteins. Studies were conducted on the enzymatic digestion of starch and toxic factors in nutrition. Sandstedt continued the cereal chemistry work until he retired in 1965 (and beyond that on grants and on his own time) (8).

It was most appropriate that Blish (the mentor) was selected to make the presentation when Sandstedt was awarded the Thomas Burr Osborne Medal by the American Association of Cereal Chemists on May 26, 1954. As Blish pointed out, Sandstedt contributed substantially to the knowledge of wheat, its components and its products. He helped develop cereal laboratory equipment and analytical methods for evaluating flour properties, and contributed to the scientific literature on protolysis of doughs.

Later in his career, Sandstedt became interested in photomicrography, especially motion pictures applied to starch studies. He applied time lapse photography to the study of enzymatic digestion of starch (9).

For a period of time during WW II, Sandstedt did considerable work on Leoti sorghum starch, as a possible replacement for cassava starch (tapioca). The seed endosperm of Leoti sorghum and the fleshy rootstocks of cassava, both consist of a waxy type starch. During WW II the availability of waxy type starch in the U.S. was greatly curtailed because of difficulties

of shipping from the tropics where the cassava is grown.

A third man joining the agricultural chemistry staff in 1922 was C. W. Ackerson. Ackerson's principal interests were in the field of nutrition, and throughout most of his career at Nebraska he carried on cooperative poultry nutrition studies with Frank E. Mussehl of the Department of Poultry Science. Beginning in the 1930's, the nutrition research was shifted to mineral nutrition and in the 1940's to studies of vitamins and to toxic aspects of feeds.

Other areas of research in the Department prior to 1953 included nature of cold resistance in crop plants; nature of herbicidal toxicity; digestive enzyme inhibitors; cereal hays; effect of leaf hopper damage on carotene of alfalfa; nutritional value of molds, legume seeds, and castor bean oil meal; and the animal protein factor.

According to the 65th Annual Station Report, January 1952, research in agricultural chemistry included these four projects: flour, enzymes of wheat in baking, naturally occurring enzyme inhibitors, and chicks (8).

1953 and After

In 1953 the Departments of Agricultural Chemistry and Chemurgy were merged into a new Department of Biochemistry and Nutrition with Robert E. Feeney as Chairman. The winter 1953-54 Station *Quarterly* stated: "Biochemistry — literally life chemistry — has become so vital to modern agricultural science that it is now used in solving nearly every research problem. For example, biochemistry is employed in basic studies of nutrition, and in work with antibiotics, insecticides, and weed killers. A major function of the new department will be to supply basic information to the other departments of the Experiment Station" (10). Feeney was highly intelligent, well qualfied academically, self-confident, innovative, and a brilliant conversationalist, but perhaps a little too aggressive. In the seven years he spent at Nebraska he left an indelible mark on the biochemistry research program.

From 1953-1975, Robert L. Ogden cooperated with the Department of Agronomy in attempting to improve quality and yield of dehydrated alfalfa. As the fuel shortage developed and the cost increased, field wilting prior to dehydration in order to reduce amount of fuel used was investigated. Field wilting prior to dehydration is a technique now used by most dehydrators. Multiple and partial cutting programs were also studied as a means of improving quality of the final product.

J. M. Daly's research during the 1960's included important contributions in the areas of respiratory metabolism, carbohydrate metabolism, and on the role of hormones in disease development. Much of his work during this period provided a foundation for additional critical studies on host-parasite interactions. A major hypothesis to emerge from his studies in the early 1970's was Daly's suggestion that plant host susceptibility to pathogens may be an inducible condition. This proposal was opposed to the generally held belief that resistance was the inducible, active host response to invading pathogens. However, Daly's data, obtained from carefully designed experiments using a genetically well-defined interaction (wheat lines differing only in a single, temperature-sensitive gene for resistance to the stem rust fungus), were so convincing and provocative that the hypothesis received consideration in both national and international research programs.

Daly's most significant contribution began in the late 70's and flowered in the early 80's. He, along with associates, determined the chemical structures of two host-specific toxins that affect corn. He also collaborated with other workers at Nebraska and elsewhere to determine the structures of three other plant pathotoxins.

Southern corn leaf blight caused severe economic losses in the U.S. during the early 1970's. This disease is caused by the fungus *Helminthosporium maydis*, race T which produces a toxin called HMT-toxin. HMT-toxin causes all the killing symptoms observed in the disease, which only affects those varieties of corn that carry the Texas male sterile cytoplasm genetic factor. Daly's chemical identification of HMT-toxin received world wide attention because of the economic importance of the disease and because it was only the second host-specific toxin to have its structure determined convincingly.

Because of Daly's chemical structure work and subsequent mechanisms of action studies, Nebraska became known as a world leader in the area of the role of toxins as determinants of plant diseases.

Robert V. Klucas has been studying the factors or mechanisms which limit symbiotic nitrogen fixation. The long-range goal is the possible enhancement of this process by controlling the limiting factors. Such a goal also involves the continuing work on the biochemical changes which occur in root nodules during growth, maturity and senescence of soybean plants. It appears that individual nodules can regain nitrogen fixing ability and currently the possible reversibility of a number of enzyme systems has been identified for study.

Research Productivity

In the years 1925 to 1974, 420 articles, prepared by the agricultural biochemistry staff, appeared in refereed journals and 25 Station/Division bulletins were published. Numerous articles were also published in trade magazines, and in the *IANR Quarterly*. No estimate is available on the number of papers presented at meetings.

Recognition for Outstanding Research

Rudolph M. Sandstedt served as president of the

American Association of Cereal Chemists, 1947-48.

Joseph Michael Daly, recipient of prestigious recognitions:

1966 - appointed University of Nebraska Regents Professor.

1980 - recipient of the University Outstanding Research and Creativity Award.

1984 - elected to the National Academy of Sciences. Only the second staff member in the history of the University of Nebraska to receive this honor.

1986 - elected to membership in the American Academy of Arts and Sciences, the first and, to date, the only University of Nebraska staff member to receive this honor.

Extension

Long History of Making Chemical Analyses

The Department of Agricultural Biochemistry has always been involved in extension activities, principally with respect to analyses of a wide variety of agricultural products. In submitting feed samples, the clientele would typically want to know if products contained the ingredients claimed for them, including protein and the possible presence of toxic materials. It was almost impossible for the College chemists to avoid a testing service.

The Analytical Service Laboratory

In 1954, the analytical services were organized into an Analytical Service Laboratory. In 1955, Robert M. Hill was brought to the University to be director of the Laboratory, in which capacity he has remained to this day.

Traditionally, the Laboratory has not done tests on water or soils since these functions have been available in the Soil Testing Laboratory of the Department of Agronomy. Until June 30, 1984, the Biochemistry Laboratory performed general chemical analyses on a fee basis on samples submitted by the general public, as well as by College staff members, both within the Department and without. Primarily the analyses were conducted on foods, animal feeds, pesticides, and manure. However, as such services became increasingly available through private laboratories, the volume went down.

For this and other reasons, on June 30, 1984, the Laboratory stopped accepting samples from the general public. Hill who had been placed part time on the Extension budget as of July 1, 1974 was returned full time to the Station/Resident Instruction payroll as of June 30, 1984. Throughout the history of the Department it was only during this 10-year period that Extension provided some funding.

The Laboratory now performs analyses for IANR staff members both within and outside of the agricultural biochemistry department. However, as other Departments develop their own chemical analysis facilities and strengthen their chemical capabilities, and as the Department of Agricultural Biochemistry shifts its emphasis to molecular engineering and other areas in the micro field, there is less and less of the traditional type of analysis done in agricultural biochemistry. Conceivably, the laboratory may be eliminated before too many more years (11).

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Chapter 2. Agricultural Communications

Contents

Names of the Department

Department of Information	1956-1973	Department of Agricultural Communications	1973-present

Administrators

Name	Title	Years served
George S. Round[1]	Chairman	1956-1963
Ralston J. Graham	Assoc. Chairman	1956-1963
Ralston J. Graham	Chairman	1963-1977
Ralston J. Graham	Head	1977-1979
Richard L. Fleming	Head	1980-1985
Jay P. Holman	Interim Head	1985-1986
Gary L. Vacin	Head	1986-present

Extension Editors, 1923-1985

Elton Lux	Asst. County Agent	1923-1924
Elton Lux	Editorial Assistant	1924-1936
Robert E. Holland	Supervisor, Programs and Information	1936-1939
George S. Round	Extension Editor	1936-1965
Ralston J. Graham	Extension Editor	1965-1979
Richard L. Fleming	Extension Editor	1980-1985

Experiment Station Editors, 1913-1985

Frank C. Dean	Bulletin Editor	1913-1916
Floyd Wambeam	Bulletin Editor	1917
R. P. Crawford	Agricultural Editor	1917-1918
C. A. Lewis	Bulletin Editor	1918-1921
R. P. Crawford	Agricultural Editor	1922-1929
(N.A.)	(N.A.)	1930-1934
R. T. Prescott	Agricultural Editor	1935-1942
Ralph Reeder	Agricultural Editor	1942-1943
Martin S. Peterson	Acting Agricultural Editor	1944-1945
Ralph Reeder	Agricultural Editor	1946-1947
Ralston J. Graham	Experiment Station Editor	1947-1967
J. P. Holman	Experiment Station Editor	1967-1985

Location of Headquarters

Agricultural Administration Annex	1956-1960	Agricultural Communications Building	1960-present

[1]Served concurrently as director of Public Relations.

Getting Information to Nebraska People

First Station Bulletin Published in 1887

The first Experiment Station Bulletin was issued in 1887. Titled *Irrigation in Nebraska* (1, p 133), it was written by Lewis E. Hicks and described Hicks' observations during a trip to study the potential of irrigation in western Nebraska. The Experiment Station has published bulletins ever since.

A department to handle information work for the Experiment Station and the Extension Service was not established until nearly 80 years later. In the meantime the Station, followed by the Extension Service when it was established in 1914, used every available channel to get its messages to Nebraska people as a vital part of the College of Agriculture mission.

In the early years bulletins constituted the primary channel. Their prompt distribution was considered so important that the operation was partially automated in 1906, when "An Addressograph mailing machine with 14,000 names (was) purchased for facilitating the work of mailing bulletins" (20).

Information programs got formal recognition in the College when Frank C. Dean was named bulletin editor[2] in 1913. Three years later Dean was succeeded—for a year—by Floyd Wambeam who died in the service during World War I (1, p 125). In 1917 R. P. Crawford, a bald and jolly bachelor, was appointed agricultural editor for the Experiment Station. A multi-talented man, Crawford used radio as well as publications to disseminate information and later taught creative writing[3].

Crawford gave radio its start in the College of Agriculture when he rigged up a small studio on the third floor of Agricultural Hall. Crawford hung heavy, red plush curtains on the wall, put insulation board on the ceiling and got "some wicker furniture from the penitentiary (which) wouldn't squeak" (2).

Elton Lux wrote (3): "The first (radio) programs were profound lectures read by college professors . . . to the few listeners who tried to hear it all on little crystal sets in their parlors." Then one of the professors (Myron H. Swenk of entomology) changed the format and probably also increased the radio audience. Swenk brought letters he had received from Nebraska people during the week, read questions from them, and gave the answers he had written in return (2). Swenk's programs were described as "the most down-to-earth and most useful (that) we had on the air."

An early home economics radio program from the College featured Mrs. True Homemaker (Mrs. J. P. Colbert in real life). Mrs. Colbert, whose real first name is True, recalls that Dean E. A. Burnett and Mary Ellen Brown, state home demonstration leader, asked her to meet with them in 1926 to discuss starting a program about foods. She agreed to take on the assignment and Dean Burnett gave the program its name.

For two years on Mondays, Wednesdays and Fridays Mrs. Colbert presented a half-hour program on women's subjects, mainly recipes. Listeners wrote the recipes on cards or requested them by mail. The cards can still be found in some Nebraska kitchens.

Mrs. Colbert was followed by Anna Dee Weaver and later by Ruth Hill. After about five years, according to Mrs. Colbert, "funding for the program ran out."

Lux developed an early "soap opera" type radio program—"The Perkins Family"—which mixed practical farm and home information with family drama. Lux portrayed a college boy with new ideas. His father, played by H. K. Douthit (then supervisor of the Farm Operators Short Course and later superintendent of the School of Agriculture at Curtis) was the "stubborn old dad who was 'agin' everything." Ma Perkins, played by Neva England (Lux's office secretary) always stuck up for her "son" (2, 3).

After he received his undergraduate degree [4], Lux and "the extension director went to see the dean of the College[5] with a proposal to put me on as an editor. The . . . dean said 'We don't need any editor.' So the extension director put me on the payroll as an assistant county agent and told me to write stories and take pictures for county agents" (3).

In addition to producing radio programs and writing news stories, Lux exerted a strong influence on the publications program. "The extension director put me in charge (of publications)," he wrote in his autobiography, "and told his staff that all new material should come across my desk . . . Some of the staff were good authors, others would rather do anything else. A few had their own favorite style and were stubborn about letting anyone edit their material. We, including the director, finally had a real go-around with one person who got all tangled up with the use of the words 'shall' and 'will' "[6] (3).

The George Round Era

George S. Round started his editorial career as a student in the College of Agriculture. He had the native ability to write the kind of news stories that newspaper editors liked to print. By the time he graduated (in 1933), he was handling all that part of the Extension Service program and getting into radio work, too (3).

[2]Over the years, the titles agricultural editor, bulletin editor and Experiment Station editor have been used interchangeably.

[3]Crawford was the author of "These Fifty Years," an early history of the College of Agriculture published in 1926, which is frequently quoted in this 100-year history.

[4]Before his appointment to the staff after graduation, Lux was employed as a student to write news stories intended to influence Nebraska boys to enroll in the College of Agriculture.

[5]E. A. Burnett was dean of the College of Agriculture in 1923. W. H. Brokaw was Extension Director.

[6]Today's editors would probably have similar opinions about authors, although it is unlikely that the distinction between "shall" and "will" would now ignite a controversy.

Round developed wide contacts with newspaper, radio, and TV people. He soon became welcome at the annual meetings of the Nebraska Press Association and the Nebraska Broadcasters. His "press office" at the Nebraska State Fair year after year turned out a snowstorm of copy (most with heavy emphasis on 4-H awards and names) for the media[7].

As extension editor, Round became best known for his leadership and participation in a radio series—"Farm Facts and Fun"—and a television series — "Backyard Farmer." (See Extending the College by Radio and Television.)

In 1945, he was appointed the first director of public relations for the University and thereafter split his time between an office on the City Campus and his Extension office on the East Campus. He traveled the state extensively in the interests of the University, and developed an acquaintance with Nebraska people—most on a first name basis—that few if any other University representatives ever matched.

"Information" Becomes a Department

The Department of Information (later Agricultural Communications) was established in 1956 (5). It combined, for the first time, all of the College of Agriculture's information services in one administrative unit. This included press, radio, publications, television, visual aids, and printing and distribution.

Equally important, the new Department combined the information personnel and budgets of the Extension Service and the Experiment Station. Prior to formation of the Department, the work of disseminating information was done in separate operations—by the extension editor and the experiment station editor (6).

Through the 1950's, many land grant universities maintained separate information units for extension and experiment station. Some still do. Nebraska was one of the first states to recognize the logic and opportunity for better coordination in an integrated operation.

Formation of the new Department also marked the first time at the University of Nebraska that a campus building was made available almost exclusively for information services. The building, since razed, was one of the oldest on the campus and not in good condition[8]. But it permitted the Department to house, under one roof, the extension editor and the extension news unit, the experiment station editor and the publications section, and the visual aids staff. For the time being, printing (mimeographing and multilithing) and bulletin mailing had to remain in an old building some distance across campus[9], but administration of printing and mailing became a responsibility of the Department of Information (6).

Before 1956, Extension Editor George Round and his staff were responsible for mass media communication for all agricultural and home economics activities — Extension, Station, and resident instruction. This included doing television programs on WOW-TV in Omaha and on other stations. Funding for mass media communication was provided by Extension.

The experiment station editor, Ralston J. Graham, had editorial and production responsibility for all publications, both Station and Extension. Graham succeeded Ralph Reeder as station editor in 1947. J. P. Holman was appointed station editor in 1967. Publications funding was provided by both Station and Extension.

The professional staff in 1955 consisted of Round; Graham; DeLoris Clouse and John Dean (visual aids-art); Eldon Madison (visual aids-photography and equipment); Shirley Marsh (home economics press, radio and television); Mike Bay (agricultural press); and Rex Messersmith (ag radio). Dwain Trenkle was a student assistant working in agricultural radio. When Messersmith resigned during the first year, Trenkle became a full time staff member. He remained on the staff until 1967, when he died in a traffic accident.

The last of the original staff to leave the University was DeLoris Clouse, who retired in 1987. However, several members of the present Department faculty were hired within a few years after the Department was organized. These included Richard L. Fleming (later department head), Dan Lutz (press leader), and Jay P. Holman (experiment station editor).

Compared with the original eight professional staff in 1955, academic and professional appointments in the Department totaled 14 in 1974.

In 1960 the Department moved into its present building. Earlier the building had housed the Agricultural Chemistry Department, among other activities. Even though it was one of the oldest buildings on the campus at that time (built in 1899), it was structurally sound. After extensive remodeling, it provided reasonably attractive working quarters and much more space than the Annex. Printing and mailing could finally be brought into the same building with the information staff (6).

The "new" building was far from perfect as a communications center, but it made possible some significant advances. As one example, an acoustically treated radio studio was constructed on the second floor. In the Department's first building, radio tapes were made

[7]A reflection of Round's stature at the University is revealed in a statement attributed to Jim Denney, veteran feature writer for the *Omaha World-Herald*, who told a friend: "Cliff Hardin (Chancellor) was lucky; he had Adam Breckenridge who knew everything and George Round who knew everybody." (Adam C. Breckenridge was Dean of Faculties) (13).

[8]While the Information Department occupied this building, it was called Agricultural Administration Annex. Formerly it had housed (at various times) the Departments of Dairy Husbandry, Poultry Husbandry and Rural Economics.

[9]This building was called the Extension Annex. It was a remodeled heating plant boiler house northeast of the present site of the Center for Continuing Education. The building was later razed.

in a very small room that formerly had been a cold storage unit for the Poultry Department. Today the Department has both television and photography studios. Neither existed in the first building.

Although Information was not a formal department before 1956, considerable creative talent had been demonstrated and well established communications programs were in place when the new unit was formed. These included the "Farm Facts and Fun" radio series, started in 1939 by Robert E. Holland, and the educational television show "Backyard Farmer", originated by George Round in 1953. Shirley Marsh (now Shirley White of Cornell University) brought the weekly television feature "House and Home" to the Department after originating it in 1953.

Ralston Graham, with support and counsel from Marvel L. Baker (associate Experiment Station director), had developed the *Experiment Station Quarterly* (now the *IANR Quarterly*) in 1952. This magazine-type publication was intended to get research information to Nebraska people faster and in more readable form than the old Experiment Station annual reports. Its coverage later was expanded to include information from all the College divisions.

The annual Station reports were retained but for many years did not include findings of research. However, beginning with the ninety-ninth report, covering the period of July 1, 1984 to June 30, 1985, a somewhat abbreviated section on research results has been restored under the heading of "Research Highlights".

Establishment of the *NebGuide* series by J. P. Holman and Earle S. Raun (associate director of the Extension Service) in 1973 brought a revolutionary change from the traditional formal Extension publications, and made possible much more timely dissemination of information.

The *NebGuide* (or fact sheet) concept was proposed to the Extension administration by Agronomy Specialist Richard A. Wiese with support from Donald G. Hanway, chairman of agronomy, and Arlen E. Lutz, state leader of programs and reports. Similar publication systems were already in use at Michigan State University and the Universities of Missouri and Maryland.

Other advances include the accelerated growth in demand for and production of slide/tape presentations, communications training for the Extension staff, and adoption of new printing and communications technology. For example, Dan B. Lutz pioneered in the transmission of information by telephone line from the Department's press section directly to the newsrooms of many of the state's daily newspapers.

The Department's teaching responsibility and the expansion of other programs led to a name change in 1973. There was a general feeling that "Information" did not adequately describe the Department's functions. And not everyone—either within or outside the Department—was satisfied with "Agricultural Communications," mainly because it did not recognize home economics. However, for the sake of brevity, this did become the Department's new name (6, 7).

Teaching

Courses in the Twenties

Agricultural journalism courses were offered in the College beginning in the early 1920's[10].

In 1925 Crawford wrote: "Agricultural journalism is now taught in the College of Agriculture. For several years a course was offered by the Extension Service for . . . students who planned on going into agricultural extension work upon graduation."

The College Bulletin for 1926-1927 listed four courses, all taught by Crawford himself: agricultural journalism (fundamentals in applied writing), agricultural editing, advanced feature writing, and advanced agricultural editing.

The University's first graduate in agricultural journalism was Glenn Buck (Class of 1927). Buck was a campus leader as a student and later was widely known as publisher of the *Nebraska Farmer* and as a rancher (16, 17). In 1926 he was elected president of the Junior Class of the University, an election which he won by a single vote (15)[11].

Two other College of Agriculture alumni and former staff members were editors of the *Nebraska Farmer*—C. W. Pugsley (1918-1921) and Carl W. Deitemeyer (1956-1957) (1, p 148 and 21).

Agricultural journalism courses were discontinued before the Department of Information was organized and no courses by that name have ever been offered by the Department. For a time the Department did teach a course in "communications skills" (later "the communications process"), but this has also been discontinued.

Although journalism is not taught in agricultural communications, Department staff members have served as academic advisors for students enrolled in two dual majors—agricultural journalism and home economics journalism. In 1975 the College of Home Economics took over advising duties for the home economics dual major.

A New Dimension

In 1964, Jean Aiken was assigned to the Department solely to teach Information 100—technical writing. This full-time commitment to classroom teaching brought a major new dimension to the Department.

Aiken had joined the English Department in 1961 and taught English 100 (also technical writing) on the

[10]Crawford's name first appears in the University teaching faculty list in the Bulletin for 1922-1923.

[11]A *Countryman* writer commented that "this is the first time Ag College has claimed (an) office of this kind, though it has had its share of athletes" (15). The writer probably recalled that a special convocation was called November 30, 1925, to honor six members of the 1925 Cornhusker football team who were registered in the College of Agriculture (18).

East Campus until the English Department discontinued the course in 1964 and Aiken's teaching line was transferred to the Department of Information[12].

With this beginning (four sections of 25 to 30 students each), Information became a full-fledged teaching department. Aiken resigned in 1968 and Virginia Book replaced her.

The Department's teaching role became even more important in 1968 when the English Department in the College of Arts and Sciences changed its freshman composition course (English 1 and 2) to a literature course. The shift in emphasis was not popular with the College of Agriculture faculty, most of whom thought students needed all the writing experience they could get.

English 1 and 2 had long been a universal requirement for agricultural students[13] because of a "strong desire to strengthen our students' ability to communicate by writing" (8). The English Department did not agree that a composition course would achieve that goal. In the spring of 1968, Dudley Bailey, then chairman of English, and Ned Hedges told a College teaching forum that "English 1 and 2 had not been successful in improving the abilities of our students to write" (8).

Dissatisfaction with the "new" freshman English led to a College of Agriculture course of study committee recommendation that English 1 and 2 be dropped as a requirement for agricultural students[14] (9). The faculty had previously voted to substitute six hours of composition and writing (Information 100 and an additional course) for English 1 and 2 (10). Information 100 was later expanded from two to three credit hours, but funding failed to develop for the additional course.

Students Produce Publications

The Department's first viable student club, Agricultural and Home Economics Communicators of Tomorrow (AHECT) was organized in 1971, as an extension of the professional group, American Association of Agricultural College Editors (AAACE).

The club gained some campus recognition through publication of *East Side Story*, issued three times each semester to supplement the *Daily Nebraskan's* news coverage of East Campus. The publication was conceived and first edited by Mike Wirth, an agricultural journalism major from Nebraska City. Faculty co-advisers were Janet Poley and Ralston Graham.

East Side Story survived two years, then ended publication because of financial stress. A predecessor, the *Cornhusker Countryman*, had ceased publication in 1952 for the same reason.

Communications Research

Members of the Department of Agricultural Communications have conducted a variety of evaluation and research studies to determine the effectiveness of various activities. Some of these studies have been conducted in collaboration with faculty in various subject areas and the Office of Extension Studies and Training in the Extension director's office. The research committee in the Department reviews needs, proposals and makes recommendations relating to research and evaluation.

The first Agricultural Experiment Station project in the Department was established in the 1970's as Project 18002, "Investigations of Information Sources, Channels and Audiences." The initial study under this project, "Farmer/Rancher Perceptions of Channels and Sources of Change Information," was published by John L. Adams, professor of agricultural communications and Anne M. Parkhurst, associate professor of biometrics and information systems (14).

Role in Colombia

The Department had a major role in the Nebraska Mission in Colombia (1966 to 1973). Six department staff members, generally on two-year assignments with the Mission, helped Colombia's ICA[15] improve and expand its ability to communicate with farm families. Counseling the Colombian staff on procurement of equipment was an important contribution.

The Nebraska staff worked with Colombian counterparts in nearly all the information areas common to U.S. land grant universities—radio, television, publications, press services, audio-visual methods (slide/tape presentations and video tape), motion pictures and photography.

Representing the Department of Information at various times were C. R. Elder, Marlyn C. Low, Ronald E. Stoller, Richard W. Tenney, Thomas F. Trail, J. J. Feight, and Wallace J. Hawkins. Low and Stoller were Nebraska county extension agents. The others were recruited from other universities. Several short-term consultants also gave valuable assistance.

[12]Mabel Strong, an English Department staff member, taught English 100 in the third floor auditorium of Agricultural Hall from 1947 until 1958. Other English teachers during this period, but for shorter terms, were Harold Huestis, Louis A. Spease, Ray L. Francis and Louise Jennings. From 1958 to 1961, this assignment was shared by several English Department teachers, including Ned Hedges, Gene Hardy, Patricia Abel and Marjorie Leafdale.

[13]In 1872, the year the College of Agriculture was created by the Board of Regents, English composition—together with commercial arithmetic and algebra—made up the curriculum of the "first term" of a "preparatory year," which preceded the freshman year (11). English composition was one of four courses taught in the "fall term" of the freshman year of 1879-80. The others were arithmetic, entomology, and horticulture and arboriculture.

[14]Information 100 (redesignated Agricultural Communications 200 when the Department's name was changed in 1973) was—and remains—a requirement for graduation.

[15]Instituto Colombiano Agropecuario.

Major Honors and Offices

George Round received the USDA Superior Service Award in 1955.

Elton Lux received the USDA Superior Service Award in 1958.

Elected president of the American Association of Agricultural College Editors (AAACE) were:
George Round - 1955-1956
Ralston J. Graham - 1971-1972

The name of the association was changed to Agricultural Communicators in Education (ACE) in 1978.

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Extending the College by Radio and Television

The advent of radio brought a new and extremely important dimension to the educational mission of the College of Agriculture. Extension was quick to make extensive use of radio to reach farmers, ranchers and homemakers. It was also an early user of television.

Notable Radio Series

Perhaps the best known radio series produced by the College—in cooperation with commercial stations—was "Farm Facts and Fun," first aired in November of 1938. It contained two eight-minute segments about agricultural and public service events, and interviews with farmers, 4-H club members, and College of Agriculture faculty members. There was music from records by the University of Nebraska band, and each week a special salute to some outstanding homemaker, farmer or farm group.

Bill Macdonald of KFAB interviews Lyle Roberts at the 1947 International Livestock Exposition in Chicago. K. C. Fouts, extension animal husbandman, is at left. Roberts, a 1940 Ag College graduate, was then a field representative for the American Hereford Journal. He later became a registered Hereford breeder near Tecumseh, Nebraska.

The program was begun by Robert E. Holland of the Extension Service in cooperation with Lyle DeMoss of radio station WOW, Omaha. When Holland died in 1939, George Round became the program co-director (4).

In 1948, "Farm Facts" transferred its origination to KFAB's Lincoln studios. Thus began a long-standing broadcast association between Round and Bill Macdonald, KFAB's farm service director. The voices of Round and Macdonald were known by farm families—and others—across the state.

Round recalls that when he and Macdonald went to the field to wire-record interviews (tape recording came later) they had to take a truck along to haul the apparatus. They strung long lines of cable from the truck to where they were talking (5).

For a number of years, Macdonald and Round produced an early morning radio show from the State Fair. They started with a recording of sounds from "Pete the Mule." Many of Macdonald's early morning broadcasts originated from his home "on Blackbird Road," a made-up location which he continued to use though he moved his real home several times.[1]

[1]Macdonald was farm service director for KFAB from 1942 to 1958, when he started working for the Stuart Stations as their farm specialist. He worked there until his death in 1968 (6).

Round believed radio was a great medium to reach farm people. For a time, he traveled to Clay Center once a week to do a broadcast on KMMJ (now at Grand Island), and to Shenandoah, Iowa every two weeks to broadcast news about agriculture in Nebraska on KMA.

Over the years, the Department of Agricultural Communications maintained excellent working relationships with a number of Nebraska radio stations. One of the closest cooperators was KRVN at Lexington, the only farmer owned station in the nation. More than 4,500 Nebraska farmers and ranchers hold stock in the Nebraska Rural Radio Association, Inc., the station's corporate name (9).

Ag Was First in NU Television

Early in September 1949, the University started a television series called "The Farm Reporter." George Round and Bill Derrick, extension animal husbandman, teamed up with Mal Hansen, farm director for WOW-TV in Omaha, to present the first program. This was only a few days after WOW-TV began operation (1).

Later in September, Ken Keller, assistant director of University public relations, and J. C. Russel, professor of agronomy, presented a program on subsurface tillage. In October, Round and Earl Maxwell, extension forester, did a program entitled "Planting of Black Walnut Trees," and H. O. Werner, professor of horticulture, presented a show on "Potato Breeding and Sweet Potatoes."

Several programs were telecast by University staff members during the 1949 Nebraska State Fair, which ran from September 3 through 8, using WOW-TV's remote facilities (2).

The "Backyard Farmer" program, widely known to Nebraska people—thousands of whom have phoned in lawn and garden questions to be answered on the air by a panel of experts—was first televised on August 3, 1953, on KFOR-TV in Lincoln (3). The studio was in a building at 48th & Vine Streets which later (January 1959) became the Umberger Sheaf Mortuary (7).

Produced by University Television and the University's Cooperative Extension Service, the show was created by George Round. Besides Round who served as moderator, panel members that first year included Harold Ball, professor of entomology; Verdon H. Petersen and Emery Nelson, Lancaster County extension agents; John Weihing, extension plant pathologist; and Wayne Whitney, extension horticulturist.

Regulars on the program for a number of years

The Backyard Farmer television panel in 1972. Seated (from left): Cyril Bish, Wayne Whitney, and David Wysong. Standing: Bob Roselle, George Round, Tom Bare, and John Furrer. Thousands of Nebraskans have phoned in questions about ornamentals, lawns and gardens to be answered on the air by the panel of experts.

were Weihing, Whitney, Bob Roselle, extension entomologist, and John Furrer, extension agronomist. Round continued as moderator until the early seventies. Tom Bare, Jim Randall and Craig Derscheid later represented agricultural communications as moderators on the program.

Following closely the advent of "Backyard Farmer", a major home economics weekly television feature—"House and Home"—was introduced. The first program, aired December 7, 1953, was hosted by Shirley Marsh and featured Karl Loerch, extension forester. The topic was Christmas trees. The show was directed by Jack McBride, then a new staff member in University public relations who later became director of University Television (8).

Other home economics editors who later hosted "House and Home" included Elizabeth Fitzgerald, Janet Kuska, Marilyn Lunner, Evalyn Vaughn, and Janet Poley.

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Chapter 3. Agricultural Economics[1]

Contents

Names of Department

Agronomy and Farm Management	1909-1911	Department of Agricultural Economics	1949-present
Farm Management	1911-1919		
Department of Rural Economics	1919-1949		

Administrators

Name	Title	Period Served
C. W. Pugsley	Head Professor	1911-1914
H. Clyde Filley	Head	1914-1919
H. Clyde Filley	Chairman	1919-1949
C. Clyde Mitchell	Chairman	1949-1956
Howard W. Ottoson	Chairman	1956-1966
Glen Vollmar	Chairman	1966-1977
Glen Vollmar	Head	1977-1982
William L. Miller	Head	1982-present

[1]The authors gratefully acknowledge the assistance of Howard W. Ottoson in the writing of this chapter.

Locations on East Campus

Rural Economics Hall[2]	1917-1935
Dairy Industry Hall[3]	1935-present

Beginning of the Department

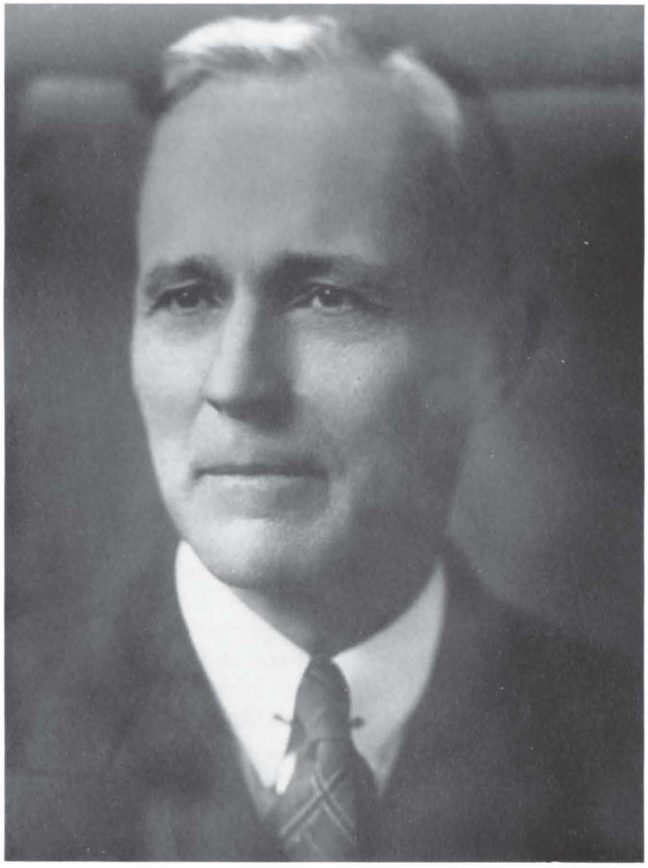
The Department of Agricultural Economics had its genesis in cost of production records kept by C. L. Ingersoll, agriculturist, and S. W. Perin, farm superintendent in the Experiment Station in the 1880's. The results were published in Station Bulletin 29, "Cost of Farm Crops". Subsequently, C. W. Pugsley, who had been hired as associate in the Department of Animal Husbandry in 1908, collected similar data by means of a mail questionnaire and in 1911 published Bulletin 122, "Cost of Growing Crops in Nebraska".

Formal teaching in agricultural economics began with the transfer of Pugsley to the newly named Department of Agronomy and Farm Management in 1909. He taught courses in farm management, farm accounting, and farm law. In 1911 Pugsley was named superintendent of Agricultural Extension and head professor of Farm Management. Thus came into being the embryo of the unit which was to become the Department of Agricultural Economics (1).

Agricultural economics originated in the U.S. from two principal roots. The first was farm management which was developed by agronomists, animal husbandmen or horticulturists who became interested in production costs, labor requirements, enterprise combinations and other aspects of organizing and managing farm businesses. The second root stemmed from economics or sociology as members of those disciplines became interested in economic or sociological problems in the rural sector, looking at them in a more global fashion (2).

The particular intellectual roots of the new departments substantially influenced their approaches and areas of emphasis for many years. However, over time they have converged to the point that the subject matter areas represented are quite similar. All of them represent a hybridization between the discipline of economics and the physical and biological disciplines of agriculture, with their areas of emphasis being influenced by the particular nature of the agriculture of their respective states.

Pugsley served as head of farm management until 1914 when he became director of Extension. He was succeeded by H. Clyde Filley, a young instructor who had joined the staff in 1911. Filley was to continue in this capacity until his retirement in 1949. From 1914 to 1916 he was a veritable one-man department—teaching farm management and accounting, starting



H. Clyde Filley headed the Department of Rural Economics for 36 years. From 1914 to 1916 he was a veritable one-man department.

research on farm business records, and participating in Farmers' Institutes.

Three additional staff members were hired in 1916, including a full-time rural sociologist. In 1921 the Department included four professional staff members, a technician, and a secretary. In addition there was an extension specialist in marketing.

By today's standards, early departmental budgets were exceedingly modest. In 1914 the budget totaled $2,600, including Filley's salary of $2,000, assistance of $200, and other expenses of $400. By 1921 it had grown to $14,900.

The Department expanded the scope of its activities rather rapidly in those early years. By 1920 it offered 13 courses, including graduate and undergraduate courses in farm management, farm accounting, marketing, rural sociology, farm law, and seminars. Graduate work at the master's level was initiated by the Department before 1920. The first recipient of a master's degree in the Department was E. A. Frerichs in June 1921.

Research activity also developed rapidly during the early years of the Department. An Experiment Station research bulletin on types of farming in Nebraska was produced in 1919 by R. R. Spafford. Filley expanded the early work on costs of producing farm products

[2]Other names of building: Dairy Bldg. - 1896-1917; Poultry Husbandry Hall - 1936-1955; Agricultural Administration Annex - 1955-1973.

[3]Renamed H. C. Filley Hall in 1972.

to encompass other aspects of farm management. He also studied prices of Nebraska farm products, particularly hog prices. Marketing research was directed at potatoes, grains, and livestock. The rural sociologist, J. O. Rankin, studied farm tenancy, farm landlords, the effect of tenure on farm investment, and farm ownership. He also directed research at various attributes of the farm family. Harold Hedges initiated extensive research on ranching and the cattle industry in the Sandhills as soon as he joined the staff in 1924. He and Filley also initiated work on the cooperative marketing of livestock in Nebraska.

Extension work in farm management via county farm management associations, which were loosely organized groups of farmers who kept records for analysis by the Department, had been started in 1912 (3); by 1913 nine counties had such associations.

By 1914, Filley carried a one-third time appointment in Extension for farm management work. Newly hired staff members Spafford and Williams were listed on the Extension staff roster as specialists in "farm surveys" in 1915. In the following year, farm account books were distributed in all counties. Much use was made of the annual summaries of such books, as well as those of enterprise records kept by farmers for extension education.

Marketing extension work was started in 1917; one emphasis was "direct marketing" between producers and retailers. A second was grain marketing. During the next few years, marketing work was broadened to include attention to potatoes, eggs, livestock and cream. Much assistance was given by the Department in the organization of cooperative livestock shipping associations, creameries, elevators, and egg circles.

A new emphasis beginning in 1919 was income tax assistance. A farm lease project was started in 1921. In the same year a miniature model of a farm, including farmstead, fields, and livestock enterprises was developed. This exhibit attracted much attention when shown at county fairs, and was the vehicle for providing assistance to farmers in developing farmstead layouts and planning crop and livestock enterprises.

By 1924, a very active, diverse extension program in farm management and marketing had been developed.

Department Administration

Beginning as a very small unit, the Department has experienced growth in professional staff numbers since its beginning. The total of three staff in 1920 had doubled to six by 1930, and nearly doubled again by 1940 to eleven. Staff numbers remained at that level until 1950, except during World War II when the staff was reduced to four members. With program expansion during the new decade, additional staff lines were added to bring the number to 24 by 1961. Staff numbers remained rather constant during the 1960's, but showed additional growth during the 1970's.

Teaching Programs

The Department of Agricultural Economics has long emphasized its teaching function as a priority activity. Service teaching — the teaching of students majoring in other departments — has always accounted for a large part of the Department's credit hour load. The number of departmental majors was not large in the early years. With a relatively small staff, teaching loads were heavy (1, p 6).

With the end of World War II, University enrollment grew rapidly with the return of veterans under the GI Bill. This affected both the College and the Department. Additional sections of some classes had to be added, especially at junior/senior levels, to accommodate veterans whose education had been interrupted by military service. These increased loads were handled with no appreciable addition of staff until the decade of the 1950's.

The number of students with majors in agricultural economics expanded greatly after the 1950's, from 13 in 1961 to 45 in 1971.

The Department began its master's degree program in the 1920's. Specific data are not available for years prior to 1929. The early program was operated on a relatively small scale. Ten MA degrees in rural economics were awarded between 1929 and 1936. Two to three such degrees were awarded per year from 1936 until 1950.

For the entire period in which the Department has trained master's level students, 305 master's degrees have been awarded — 28 in rural economics and 277 in agricultural economics. Before 1958, these students had received the MA; however, at that time they began to receive the MS, reflecting the increasing research orientation of the degree.

In 1956 the Department was encouraged by the College administration to develop a proposal for a PhD program. This was not received enthusiastically by all department staff; some felt that such a program would detract from the considerable momentum and degree of excellence characterizing the master's program. There was also the fear that Nebraska could not compete for quality candidates with other states with established programs.

However, the Department did proceed to develop and submit an application for authorization to offer a PhD degree, which was approved in 1957 by the Graduate College and the Board of Regents. The first graduate of the new program was Carlos Manese in 1964. From that time through 1983, 52 PhD degrees had been awarded to agricultural economics students.

Student Clubs

Oikia Club. Briefly in existence in the 1920's was the Oikia Club, for which all undergraduate and graduate students with at least five hours in rural economics were eligible (5). Its monthly meetings were

addressed to a discussion of current topics. It apparently went out of existence in 1928 or early 1929.

The Agricultural Economics Club, including as members both undergraduate and graduate students, was started in the late 1950's. Its objectives were both social and professional. It has sponsored special seminar programs. An outgrowth of club activity was the creation by the Lincoln Agribusiness Club, sometime after 1960, of a series of awards recognizing both graduate and undergraduate scholarship. Another by-product of club activity was the creation of the Agricultural Economics Student Protege Program in 1969. This informally brings together students and businessmen for acquaintanceship, visits to places of business, and travel, in a "buddy" system aimed at assisting students with their careers. The club is now called the Agricultural Economics Agribusiness Club.

Research

Basic to the research programs of the Department of Rural Economics from 1925 to 1950 were farm business records and cost of production records. Both stemmed from cooperative effort between extension and research staff. Farm business records were obtained by making farm account books available to farmers in various parts of the state, training the cooperating farmers in record keeping, calling the books in at the end of the year, summarizing them in the Department, and then returning them as well as selected comparative data to the farmers. County extension agents assisted in this activity. Basic data were accumulated from one year to the next and formed the basis for various analyses, such as "factors affecting farm earnings" which were published from time to time.

Cost of production studies were typically derived by farm surveys obtained from farmers on an enterprise basis by extension and research staff. Most commonly obtained during the 25 year period were cost records for corn and wheat. Additional data were obtained less consistently for the cost of producing oats, potatoes, sugar beets, beef and range cattle. These data were used in extension work and were also the basis for reports analyzing long term trends. Combine harvesting was first studied in 1927, tractor costs were first studied in 1933, and in 1938, A. W. Medlar wrote the first bulletin on farm machinery costs (7).

Farm tenure, farm product prices, land prices, and cooperative organization were other research topics in the departmental portfolio in 1925; except for cooperative organization, they were generally continued until 1950. However, the scope of the research program was broadened from year to year.

The first area study was started in 1924 by Harold Hedges on the Sandhills (1, p 5). The three-year study was reported in Station Bulletin 215, *A Survey of the Cattle Industry in the Nebraska Sandhills* by Hedges and Filley, published in 1926; and Station Bulletin 231, *Economics Aspects of the Cattle Industry of the Nebraska Sandhills* by Hedges, published in 1928.

Marketing costs became a topic of continuing research attention starting in 1926. In 1927 the first of several bulletins on what today would be termed consumer economics was published by J. O. Rankin, a sociologist. He studied the use of time in the home, the cost of feeding a family, clothing costs, housing, and standards of living. He was a prolific author, producing 12 bulletins from 1919 to 1932 (1, p 6).

An exhaustive study of types of farming in Nebraska was reported in 1930 by Harold Hedges and F. F. Elliott (8). This was followed by another report by L. F. Garey in 1937 (9), an outgrowth of farming adjustment studies which had been started as a result of drought and depressed conditions in Nebraska agriculture. These studies were followed, starting in 1939, by land use planning studies done in cooperation with USDA. After the accumulation of large quantities of basic data, land use planning work was shelved because of the competition of the War effort and the data were never utilized to any significant extent. This research was replaced by the agricultural capacity studies of World War II which were followed, in turn, by land use adjustment studies of the immediate post-war period.

The 1930's brought departmental effort in the farm finance area with investigations of farm mortgage foreclosures, farm mortgage history, and farm credit. Tangentially there was almost continual interest in land prices (10). The relation between sale value and assessed value of farmland was also investigated, as were local public services and the effect of the tax system on agriculture.

Land tenure investigations figured importantly in departmental research history. There were reports on the process of attaining farm ownership in 1926 and on farm tenancy in 1941.

The first of a long series of studies of the economic aspects of irrigation reported by Frank Miller and Filley in 1937 focused on the benefits of irrigation from the Kingsley Reservoir. A survey of pump irrigated farms in Buffalo County was reported in 1944 by A. W. Peterson. T. S. Thorfinnson and A. W. Epp evaluated alternative systems of farming for the Tri-County irrigation area in 1948.

The period 1949-50 was a watershed for Department research programs. New research approaches and technologies were in the offing. Descriptive approaches in research were to be replaced with heavier guidance by theory, more attention to research design, more powerful statistical techniques and reliance on more powerful computing machinery which made possible more rapid analysis of large volumes of data and the use of mathematical programming techniques in projective, synthetic analyses.

An important factor bearing on research programs was the passage of federal marketing research legis-

lation in 1946 (see Part II, Chapter 3). This led to the creation of a number of regional marketing research projects and a significant expansion of marketing research programs in the Department. Since 1948, research has been directed at the marketing of all of the principal Nebraska agricultural products. Much of this work was carried on in cooperation with other states via regional research projects; USDA marketing specialists also participated. As time passed, the scope of such work was expanded from simple consideration of volume/price/cost relationships to "structure" (i.e., organizational characteristics), "performance" (i.e., the efficiency of certain types of firms or functions), pricing, transportation, impacts of the law, effects of more "orderly" marketing, brand differentiation, vertical coordination, factor markets, and supply and demand structures. More specialized work dealt with efficiency and economics of size in grain elevators, flour mills, fertilizer distribution facilities, retail supply firms and trucking firms.

Farm management research took several courses after 1950. Associated with irrigation development in the state were projective studies analyzing alternative systems in the Republican Valley, the Loup River area, and south central Nebraska; a study of pump irrigation in central Nebraska; analysis of pump irrigation costs; analysis of water distribution costs; and leasing arrangements on pump irrigated farms. Crop and livestock systems were analyzed in northeastern Nebraska, in the North Platte Valley, southeastern Nebraska, southwestern Nebraska; and in the Sandhills. Size of farm was studied in northeastern Nebraska. Several machine cost studies were conducted. Specialized enterprise cost studies were conducted for cattle feeding and wheat. More aggregative studies dealt with economics of cropping systems.

Against the backdrop of a long interest in leasing arrangements, Nebraska participated in a large regional leasing study in the early 50's. This was followed by participation in another exhaustive four-state study on relative efficiency of alternative leasing arrangements, conducted in the late 1950's. This study was unique at the time for the statistical design for testing of marginal productivity of resources as affected by leasing arrangement. A related regional effort during the same period was a large project on "Getting Established in Farming" in which Nebraska participated heavily.

Land prices, and the assessment of farmland, were the subjects of several research efforts. A procedure for assessment was reported in 1949; a succeeding study, the report of which was reprinted twice, was completed in 1954. The department participated in a Great Plains study in which alternative sources of tax revenue were analyzed; a station bulletin, produced in 1962, was part of the basis for the state income tax law drafted a few years later. In the meantime, land sales/assessment ratios for the state were analyzed in 1954 and in 1968. A study late in the 50's dealt with the farm real estate market, as did one ten years later.

Law and economics were jointly applied in research beginning in the 1960's; the first effort was an examination of Nebraska water law, and possible changes. This was followed by analyses of commercial farm law, interstate legal barriers to transportation, minimum wage legislation, farm partnerships, fence laws, and water administration.

Risk in agriculture has been the subject of several research projects. Crop insurance was examined in the early 60's as part of a Great Plains research effort. At the same time another Great Plains project addressed farming strategies in the face of risk and uncertainty. More recently other analyses have been made of all-risk insurance for wheat and row crops; of crop insurance; hail insurance; and limiting liability from using land for recreational purposes.

Very productive has been the collaboration between Richard Felton of the Department of Economics and, first, C. J. Miller, followed by Dale Anderson, concerning transportation.

Starting in 1960 a number of aggregative studies of a supply/demand orientation were undertaken in the Department. The earliest concerned optimal hog marketing weights. This was followed by a supply response study for beef and hogs, a study of supply response for wheat and feed grains, a study of technological change in agriculture, an analysis of the economics of orderly marketing in the beef/pork sector, a study of changes in the comparative advantage of wheat and feed grains in the Great Plains vs the Northwest, and an analysis of investment strategies for grain/livestock farms.

Some research also took place in the area of agricultural policy and trade. The operations of the Soil Bank and the Conservation Reserve programs were studied, as well as the feasibility of land use easements. A regional study of the 60's dealt with the impact of the European Common Market. A study in the early 70's dealt with the production adjustments to farm program, and a second with agricultural exports.

Over time the computer has facilitated research operations. One of the early applications was the solution of linear programming problems by computer by James Kendrick. His first effort was the design of sausage formulation for American Stores, Inc., under a grant from that firm. This led to an interdepartmental project on formulation of rations. Most recently has been cooperative work with the Department of Food Science and Technology to synthetically blend and evaluate food proteins to meet specified nutritional properties.

A research area which had only a brief history in the Department was rural sociology. The second rural sociologist to be employed, John P. Johansen, joined the Department in 1948, but resigned in 1951. Another sociologist, A. H. Anderson, was stationed with the Department by the USDA, in 1951, but retired in

1952 with a contraction in the USDA program in the sociology area. Two publications resulted from their efforts, particularly those of Anderson, on the small town and the rural community. Efforts were made in the 1960's to reinstate rural sociology research, but these aborted because of budget stringencies.

Examples of Outstanding Research

The following research projects are examples of studies which were unique in approach, or particularly interesting in content or results.

The Transition Area Study. This study, whose official title was "Adjustments Needed in the Use of Resources in the Transition Area of Nebraska", was made possible by a rather substantial grant from Resources for the Future, Inc., Washington, D. C. Starting in 1956, it continued for eight years. The study was focused primarily on a pilot five-county area in central Nebraska, which was regarded as an area of physical and economic transition between the Corn Belt to the east and the more extensive farming and ranching regions to the west. Secondarily, the study drew for background data on other counties in North Dakota, South Dakota, and Kansas. The study was interdisciplinary, involving economists, sociologists, and soils specialists. The study staff included A. H. Anderson, P. A. Henderson, Howard W. Ottoson, Loyd Fischer, Roger Willsie, Eleanor M. Birch and Andrew Aandahl, as well as eight graduate students, and Mrs. Lois Collings, librarian.

The study involved historical analysis, analysis of farm organization and income, factors affecting capital accumulation, economics of size, farm finance, resource productivity and efficiency, as well as an examination of the dynamic aspect of the various components of the rural community. One of the more interesting features of the study was a series of projections toward the end of the century of farm size, resource productivity, enterprise structure, the number of farms, financial practices, population adjustments, public services, and rural communities.

The primary report of the study was a book published by the University of Nebraska Press (11). The research provided the basis for a rural development extension program in the pilot area.

The Baking Study. In 1957, the Department was awarded a contract from USDA for a study of "Changes in the Organization and Practices of the Perishable Bakery Products Industry and the Impact of Such Changes upon Growers of Farm Products Used by the Industry". This project was designed at a time of great interest in Congress and among regulatory agencies concerning widening market margins and declining farmer's share of consumer bread prices. The objectives were to 1) describe the changes in market structure and organization of the bread industry since 1946; 2) analyze the factors associated with combinations and integration in the industry; 3) analyze the changes in price and nonprice behavior of firms, and; 4) analyze the impact of these changes on industry performance. This study was exceedingly ambitious; it involved methodological innovation as far as structure research in the baking industry was concerned. It demonstrated the tendencies toward less efficiency and the pushing of processing and selling costs toward the consumer which characterized the changes taking place in the baking industry at that time. It also demonstrated the feasibility of integrating technology and cost analysis with market organization and behavior analysis, to appraise industrial performance.

Personnel involved in this study included Richard G. Walsh, Bert M. Evans, and Eleanor M. Birch. The study was finished in 1963.

Feed-Livestock Demand Study. The formal name of this project was "The U. S. Feed Concentrate Livestock Economy's Demand Structure, 1949-59". It was conducted in the early 1960's as a portion of a North Central Regional study by James B. Hassler and Carlos Manese. The unique character of the study lies in the tight methodological approach which was followed, the ability demonstrated to effectively model the importance of the agricultural economy, and the degree to which the projections made in the study have been demonstrated to be well based.

In this study, the U.S. aggregate demand for feed grains and concentrates was estimated by derivation from consumer demands for beef, pork, broilers, turkeys, eggs, and milk for 1949-59. The demand structure was projected for 1960-70.

Extension Work

Extension work in agricultural economics during the 25-year period starting in 1924 was heavily focused on farm management and cooperative marketing (1, pp 5-8, 3). In farm management much effort was devoted to the promotion of farm accounting; farm accounting clubs were organized; farm account books were distributed through county extension agents and country bankers. Teaching farm bookkeeping in rural schools was promoted through county superintendents. By 1936 farm bookkeeping could be substituted for bookkeeping in high school curricula. 4-H farm accounting clubs were started in 1934.

Much effort was devoted by farm management extension and research faculty to the summarization and analysis of farm records. Seventy-seven farm records were completed in 1926. By 1929, 537 farm records were completed and analyzed. This number grew to 819 in 1931, and reached a peak of 1,406 in 1934. After that, the number diminished to 687 in 1939, 316 in 1942, 158 in 1945, and to slightly over 100 in the late 1940's. This activity was maintained on a much smaller scale until 1960.

Farm record keeping for farmers had a rebirth in 1961 with the development of NebFarm, a comput-

erized record keeping system. As this activity grew to include 300 farms, it evolved to a district approach. The first district association was organized in 1975.

Cost of production studies, previously mentioned, provided data for extension work. An elevator accounting project was started in 1927 by the farm management staff. It continued for several years and was ultimately taken over by the marketing staff.

Agricultural outlook came in for attention during the 20's and 30's. A popular publication, "Nebraska Economic Situation", was initiated in 1925 and distributed to an extensive mailing list, reaching as many as 3,600 farmers. Agricultural outlook became a regular extension activity in 1926; staff members used the annual National Outlook Conference held in Washington, D. C. by USDA as a source of information.

Changing conditions in the farm economy affected farm management extension during this period. Thus, in 1930 a new extension project, "Economic Adjustment", was started. The subject of farm real estate taxes came to the fore in the same year. In 1932 the efforts of the entire departmental extension staff were apparently devoted to the "Wheat Adjustment Program". Similarly much effort was devoted in 1933/34 to the AAA program and associated land use planning.

Marketing work in the Department from 1924 to 1946 involved educational effort concerning the feasibility and then management of cooperative poultry, egg, dairy, and hay marketing as well as gas and oil purchasing associations. It was a period of intense development of cooperative marketing enterprises, stimulated in part by the Federal Farm Board. In 1935 a large elevator survey was taken, in cooperation with the Farm Credit Administration. This activity lasted several years and was the basis for much subsequent attention to cooperative finance.

Starting in 1945, a curious hiatus apparently developed in marketing work in the Department. The annual extension reports suggested no activity until 1948 when they indicated that dairy and poultry marketing work was being carried on by specialists in the Departments of Dairy Husbandry and Poultry Husbandry, respectively. It was not until 1952 that a general agricultural marketing specialist was employed in the Department of Agricultural Economics.

World War II greatly affected farm management extension work. Labor efficiency appeared as a new topic. With improving farm incomes, income tax education became popular. Increasing land values brought interest in appraisal, as well as leasing arrangements. Irrigation costs data were collected. Production capacity studies reflected the national objective of increasing food production.

With the 1950's the extension program of the Department underwent further change. Changing times, staff turnover, and additional staff affected program patterns (1, pp. 12-16).

The first PhD extension specialist, Richard Ford, was hired in 1952. Since that time, the terminal degree has become a customary requirement for extension staff in the Department. [Unfortunately, the annual cooperative extension reports from 1964-1969 cannot be found; informal recollections of staff are part of the basis for this section.]

The annual cooperative extension report of 1969-70 illustrates the evolution of extension programs in Agricultural Economics since 1950. That report included the following topics reported by the eight departmental extension staff: foreign agricultural policy, national agricultural policy, property taxes in Nebraska, farm cash flow analysis, farm organization planning, bankers short courses, leasing arrangements, father-son arrangements, linear programming farm management workshops, computerized record analysis, income taxes, custom rates for farm machinery, livestock outlook, bargaining power in agriculture, commodity futures, and business management training.

The following example programs illustrate interesting educational thrusts by departmental extension faculty where educational impacts were discernible.

Agricultural Policy

Starting in 1950, agricultural policy became a priority topic in departmental extension programs. Coordinated by Everett Peterson, several years saw team efforts by departmental staff which involved intensive informal educational efforts identifying agricultural policy alternatives and their consequences. The largest effort probably occurred in 1961. It involved six staff members.

State Tax Alternatives

Again under Peterson's leadership intensive educational effort was projected by departmental staff in the early 1960's concerning tax alternatives in Nebraska—property vs sales vs income taxes. This program is credited with contributing to the adoption of state sales and income taxes in Nebraska in 1967.

Estate Management in Agriculture

This program, led by Philip A. Henderson, was enthusiastically received in the many locations in the state where it was presented from 1969 to 1978.

Linear Programming Approaches in Farm Management

This program, led by Larry Bitney and Philip Henderson, moved farm planning education forward dramatically in terms of efficiency and intellectual power it represented, when it was conducted in 1963-64.

Progress, Problems, and People in Mid-America

This Great Plains regional program, led by Everett Peterson, involved the production of six Great Plains Council publications and five half-hour color films which were used in educational programs in all of the 10 Great Plains states in 1968-70.

Cooperative Management

Started in 1964 under the leadership of Mike Turner, this program has been conducted cooperatively by the University of Nebraska, Iowa State University, and South Dakota State University, and cosponsored by the Omaha Bank for Cooperatives. It has been directed at managers and directors of farm cooperatives, covering such topics as management, planning, legal background, and operations.

Trading in Grain Livestock Futures

This program was started in 1964 by Mike Turner. It was first directed at beef, but subsequently expanded to hogs and grain by Allen C. Wellman and Lynn H. Lutgen.

Three long time extension specialists were Douglas D. Duey at the Southeast Research and Extension Center, Paul E. Miller at the South Central Station, and Cliff Ashburn at the Panhandle Station.

International Programs

The Mission in Colombia[4]

A new department of agricultural economics was established jointly at the Colombian Agricultural Institute (ICA) at Tibitata and the National University at Bogota. The Nebraska staff were appointed for teaching at the National University and for research and extension at ICA. Ultimately, there were eight staff members in the new department, covering farm management, marketing, land economics, and policy. Additional agricultural economics staff were also appointed at Medillin and Palmira.

Loyd Fischer served a two-year assignment with the Colombian program, being stationed at Bogota. Agricultural economists from other participating institutions also took assignment with the program.

The Colombian Agricultural Economics Association was organized in 1967. Approximately 100 persons attended the first meeting.

Foreign Student Training Course

During the period 1960-67, the Department operated a foreign students training course sponsored by the USDA and financed by USAID. The course was taught in the summer session and typically included about 10 foreign graduate students studying at U.S. universities under USDA auspices.

UN Technical Assistance Program in Turkey[4]

The Department was ably represented on the Nebraska staff in Turkey by Leo J. Fenske of Minnesota, as farm management specialist. Fenske spent an extended period of time at Ataturk University in Erzurum. His program was considered highly successful.

Federal Cooperation

The Department has long had a tradition of close cooperation with federal counterpart agencies. The Bureau of Agricultural Economics, USDA, later renamed Economic Research Service, has participated heavily in joint projects with University staff members since the 1920's; in fact several of the projects probably reflected more federal input than state resources. Beginning in 1950 federal staff members were physically stationed in the Department. The BAE (later ERS) staff members were accorded all of the privileges and participatory opportunities of departmental membership; the relationships have always been of a most cordial nature. As many as five USDA professional staff members were stationed with the Department in 1960.

The Tennessee Valley Authority negotiated for the stationing of professional personnel at Nebraska for regional activity. John L. Bucy and James C. Kramer were the first arrivals, followed by William Sutherland and Harry Kittams. The program involved stimulating research and demonstration of new fertilizers and fertilizer processes.

Related Organizations

Nebraska Society of Farm Managers and Rural Appraisers

This organization had its beginning as the Nebraska Mortgage Bankers Association in the 1930's. The Nebraska Society of Farm Managers and Rural Appraisers, organized in 1948, was an offshoot of the earlier organization. The first secretary of the new organization was Frank Miller of Rural Economics. Since that time the secretaryship has been held by a member of the Department. Miller, as secretary, was followed shortly by Norris Anderson, who in turn was followed by P. A. Henderson who held this position from 1952 to 1966. Douglas Duey assumed this assignment in 1967, followed by Larry Bitney in 1978.

The Nebraska organization became a chapter of the American Society of Farm Managers and Rural Appraisers in 1977.

The Agribusiness Club

The Agribusiness Club of Lincoln was conceived and organized in 1962 by Gilbert Erickson, then manager of Farmland Industries, Inc. of Nebraska, Philip Henderson, and Howard Ottoson. It has traditionally had a close association with the Department. A most meaningful activity by the club was the provision of

[4]See also Part II, Chapter 5.

a number of awards for scholarship of undergraduate and graduate students in agricultural economics.

Major Honors and Offices

Staff

Regents Professor -
Howard W. Ottoson - 1965

Recipient of UNL Distinguished Teaching Award:

James Kendrick - 1969
Ronald J. Hanson - 1978
Dean A. Linsenmeyer - 1983

President of a major university -

C. W. Pugsley, South Dakota State University - 1923-1940

U.S. Cabinet position -

Clifford M. Hardin, Secretary of Agriculture - 1969-1971

Served in the Nebraska Legislature -

H. Clyde Filley - 1911-1912

Alumni

Recipients of honorary doctorate degrees:

C. W. Pugsley, University of Nebraska - 1922
Christian (Chris) L. Christensen,
Univ. of Nebr. - 1937
Earl O. Heady[5],
Univ. of Nebr. - 1960
University of Uppsala, Sweden - 1965
Warsaw Agricultural Univ. - 1965
Debrecen University (Hungary) - 1965

International Distinguished Service to Agriculture Award from the Honor Society of Agriculture, Gamma Sigma Delta:

Earl O. Heady - 1974

USDA Superior Service Award -
Norman E. Landgren - 1974

U.S. Cabinet position, or equivalent:

Clayton K. Yeutter, U.S. trade representative with rank of Ambassador - 1985-present

Chief executive officer of a national corporation:

Clayton K. Yeutter, President, Chicago Mercantile Exchange - 1978-1985

Served as member of the Nebraska Legislature:

Jerry D. Miller - 1984-present

[5]Heady majored in animal husbandry but did graduate work at Nebraska in agricultural economics and spent his professional career in agricultural economics.

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Chapter 4. Agricultural Education[1]

Contents

Names of Department

Department of Agricultural Education	1918-1920
Department of Agricultural and Home Economics Education	1920-1922
Department of Vocational Education	1922-1962
Department of Agricultural Education (2)	1963-present

Administrators

Name	Title	Period served
Harry E. Bradford	Head	1918-1919
Harry E. Bradford	Chairman	1919-1949
Claud E. Rhoad	Chairman	1949-1951
Howard W. Deems	Chairman	1951-1965
James T. Horner	Chairman	1965
John H. Coster	Acting Chairman	1965-1966
James T. Horner	Chairman	1966-1975
Roy D. Dillon	Interim Chairman	1975-1976
Osmund S. Gilbertson	Chairman	1976-1977
Osmund S. Gilbertson	Head	1977-present

Location of Headquarters

Headquarters for the Department has always been in Agricultural Hall.

The Formative Years

First Course — Agricultural Pedagogy

A. E. Davisson was the first professor of agricultural education. In 1907 he taught a course in agricultural pedagogy. Davisson was followed by Fred Hunter, and in 1912, Harry E. Bradford, principal of the School of Agriculture, was assigned to teach the college courses in agricultural education (1, pp 27-28).

A boost in the demand for teachers of agriculture came in 1913 when the Nebraska Legislature passed the Shumway Act. In 1915 the demand was again increased by passage of the Mallery Act, according to a Department of Vocational Education report written by Leroy D. Clements in 1963. These acts both offered state aid for schools teaching agriculture but made no provision for training teachers. The big incentive, however, came in 1917 with passage by the United States Congress of the Smith-Hughes Act. This law provided aid to states for 'teacher training' as well as funds for establishing departments of vocational agriculture in local high schools.

The College of Agriculture already had the teacher training machinery in operation. Upon designation by the State Board[2] as Nebraska's "official training center", it was ready to assume the responsibilities. Bradford was selected as head of the Department of Agricultural Education to organize and conduct the new program (1, pp 27-28).

Practice Teaching Centers

Through the years 1907-1919 the courses in agricultural education were general and historical in nature with no attempt to attack the problem of teaching methods. When the Department was enlarged in 1919, methods and organization courses were introduced and practice teaching centers were established in neighboring town high schools having vocational agriculture. The first practice centers were at Waverly,

[1]James T. Horner provided continuing assistance in the preparation of this chapter.

[2]State Board for Vocational Education. The Smith-Hughes Act was accepted by the Nebraska Legislature and approved by the Governor on April 25, 1917. To be eligible for Smith-Hughes benefits a state was required to set up a State Board for Vocational Education and make formal application (1, p 15).

Eagle, Seward and Crete (3, pp 34-35 and 1, p 29).

According to Clements, "Among the earlier 'critic' teachers in local schools who helped with the practice teaching program should be mentioned the names of George A. Spidel, Byron McMahon, Richard M. Kildee, and Ralph W. Canada" (1, p 29).

The 1918 Agricultural College catalog listed two courses in agricultural education. One was called history of vocational education and the other merely vocational education. The next year, 1919, there were four courses: 1) vocational education, 2) organization and administration of agricultural education, 3) methods of agricultural teaching, and 4) supervised teaching.

In 1920 the program was known as Agricultural and Home Economics Education. Instruction in teaching home economics had been added with special women professors under Bradford's overall direction. By 1922 the offerings in this department had grown to 11 courses. It was then that the name of the Department was changed from Agricultural Education to the Department of Vocational Education (1, p 29).

A reorganization in 1963 moved instruction in vocational home economics to the newly created School of Home Economics, and the name of the Department was changed back to Agricultural Education. Students majoring in home economics extension enrolled in the School of Home Economics, and those majoring in agricultural extension in the Department of Agricultural Education.

Courses in extension education had been taught first by Elton Lux and Ethel Saxton, and later by Duane Loewenstein and William D. Lutes. The extension major was administered by Cooperative Extension (5).

Cooperation with the Teachers College

"The University of Nebraska Teachers College on the downtown campus was . . . established in 1908", Clements wrote (1, p 28). "One branch of its work was given to (the) Department of Agricultural Education at the College of Agriculture. This cooperative arrangement was continued when the new Smith-Hughes plan was put into operation. The teacher education curriculum for agriculture was primarily at the College of Agriculture. Departmental staff members were also members of the . . . Teachers College staff. However, they spent most of their time at the College of Agriculture.

"The students in agricultural education were offered all the advantages of a small college coupled with those of a big university. They had intimate associations with fellow students and faculty on the College of Agriculture campus. At the same time they could take part in all University affairs and be a part of the larger group. As a result, a better student spirit developed along with broadening social experiences."

Present Administrative Organization

Nationwide, about half of the agricultural teacher education units are administered in colleges of education. In 1969, the Nebraska agricultural education staff conducted a self-study with a view toward transferring to Teachers College. The study acknowledged that some problems arise for social scientists in a predominately biological and physical science environment, in terms of curriculum requirements for students as well as publication, promotion and research of staff members (6).

However, the study conceded that the benefits outweigh the costs in terms of close association with other departments in the College of Agriculture. These are the departments that provide research, instruction and support materials in the subject matter that agriculture teachers are preparing to teach.

At the University of Nebraska, some staff members in agricultural education have joint appointments in Teachers College and selected courses are cross listed. Within IANR, the agricultural education staff hold joint teaching-extension and/or research appointments.

Recently, staff members have had special appointments within IANR such as director of LEAD and as teachers of computer literacy, career education and honors seminars in the College of Agriculture.

Teaching

A Unique Role

The Agricultural Education Department was designated (and it remains) the sole official training center for vocational agriculture instructors for the State of Nebraska. The Department places student teachers in secondary schools for full time practice teaching for durations of eight weeks. The staff provides frequent on-site supervision (6).

This close contact with high school teachers and students puts the agricultural education faculty in a unique role. Studies have shown that more than half of the College of Agriculture students had been enrolled in high school vocational agriculture. The faculty has maintained an in-service education program, providing "a new teacher course" plus workshops and courses for secondary, post-secondary and College of Agriculture instructors.

Although the primary mission of the Department has been to prepare high school vocational agriculture and adult teachers, and more recently post-secondary teachers of agriculture, studies in both the mid 60's and mid 70's showed a wide range of employment by graduates.

About half initially entered teaching, and 30 percent remained in that field for five years. Generally, 15 to 30 percent pursued one of the following, depending on the agricultural economy: 1) production agriculture, 2) management and sales in agribusiness, and/or 3) college positions, including work as coop-

erative extension agents. Others enter a variety of vocations including government, military and foreign service (6).

The Graduate Program

The first master's degree in vocational education was granted to Clyde Walker in 1930. In 1962, Walker's occupation was shown as "Agr. Eng., General Electric Co." (1).

The next degree granted was to Vilas J. Morford in 1933. Morford's occupation in 1962 was "Vo. Ag. Teacher Training - Iowa State University" (1).

Through 1984, a total of 233[3] master's degrees in vocational or agricultural education had been granted.

PhD and EdD degrees are not granted in agricultural education, but doctorates are granted in teacher education through the Teachers College. Administration is by the Graduate College.

Vocational Agriculture Contests

The Department has organized and coordinated high school vocational agriculture contests since they were inaugurated in 1918.

The first Nebraska public high school vocational agriculture judging contest was held in 1918 on the College of Agriculture campus when Howard J. Gramlich, chairman of Animal Husbandry, extended an invitation to departments of vocational agriculture located near Lincoln. The first contest consisted only of livestock judging. About 50 high school students competed. Since then the contests have been an annual event on the campus.

C. C. Minteer directed the contests from their inception in 1918 until 1950 when H. W. Deems assumed this responsibility. M. G. McCreight was coordinator from 1951 through 1973 (4, p 20).

Following McCreight as coordinators were, successively, Richard Douglass, Roger Gerdes, Leon Wissman, Lloyd Bell and Clifford McClain, who is presently coordinator — 1987 (5).

Shortly after the beginning of the livestock judging contests at the state level, other departments on the campus became interested. In 1987, 14 contests were conducted by the Departments of Animal Science, Agronomy, Horticulture, Entomology, Agricultural Economics and Agricultural Engineering (4, p 20).

Student Club

Alpha Tau Alpha, a national honorary agricultural education fraternity, plays a vital role in preparing students who plan to teach vocational agriculture. The fraternity was founded in 1921 by A. W. Nolan and a group of his students at the University of Illinois. There are now 43 chapters in training institutions throughout the nation.

[3]Sixty-two master's degrees granted between 1930 and 1962 (1) and 171 from 1963 through 1984 (7).

Beta Chapter at the University of Nebraska was organized April 11, 1925. Loyal Rulla was the first chapter president; Franklin Allen the first secretary; and Bradford was advisor for the first group. Other early officers included L. N. Cyr, Orlando S. Bare, and George West.

On February 10, 1956, 46 members of the Vocational Agriculture Association of the University of Nebraska became charter members of the reorganized Beta Chapter.

Lewis Zamanek was president; Alan Hoeting, secretary; and H. W. Deems, advisor of this reorganized group. Since 1956, 431 persons have been initiated into the fraternity, making a total of 487 national members of Beta Chapter (4, pp 48-49).

Research

Research and creative activities have focused primarily on the practical, such as development of curriculum materials, improved teaching methods and student teaching, career opportunities and decision-making, advisory councils, computer literacy, and leadership development.

When U.S. Office of Education (USOE) research monies became available in 1964, the agricultural education staff was awarded the first grant — over $100,000 annually — for a four-year experimental project involving 24 Nebraska high schools. The purpose was to "assess approaches to preparing high school students for off-farm agricultural occupations."

The Nebraska Research Coordinating Unit for all vocational education — funded at over $100,000 per year by the USOE — was developed and directed from 1965 to 1972 by agricultural education staff members. John K. Coster and James T. Horner directed the USOE projects.

Related Organizations

Future Farmers of America. The National FFA Organization held its first convention in November 1928 in Kansas City, Missouri. Nebraska was one of the 18 states represented at this first convention. Alvin Reimer of Dewitt, Nebraska, and from the Beatrice Vocational Agriculture Department, was named central regional vice president.

The first two chapters in Nebraska were chartered in November 1928 at Beatrice and Eagle under the advisorship of L. D. Clements and Clyde Walker, respectively. The State FFA Association issued 223 local charters from 1928 to 1984. In 1984 there were 135 active FFA chapters in Nebraska (4, p 33).

Nebraska Vocational Agricultural Foundation was incorporated January 24, 1968 to receive and administer funds for leadership development in Nebraska, especially the Future Farmers of America.

To accomplish these objectives, the Foundation accepted, as its primary emphasis, the 27-acre Nebraska

Youth Leadership Development Center near Aurora (often referred to in the early days as the State FFA Camp). Before the Foundation was established, the camp (originally purchased for $30,000) was operated by a "camp committee" appointed by the Nebraska Vocational Agricultural Association.

According to M. G. McCreight, "Irving Wedeking of Aurora is to be credited with the major share of the leadership provided during the establishment and early years of the Foundation." Others to join Wedeking on the original Foundation board of directors were Dean Jochem, Ainsworth, vice president; Ted D. Ward, Verdigre, secretary-treasurer; and Donavan Benson, Syracuse; Reuben Epp, Henderson; Myron Schoch, Lyons; Harold Johns, Bassett; Duane Dunning, St. Paul; Jim Boyle, Aurora; Stanley Elsen, Grant; Raymond Snyder, Lyman; B. E. Gingery of the state staff; and James T. Horner of the University of Nebraska-Lincoln.

The Nebraska Young Farmers and Ranchers Educational Association was organized November 24, 1962, at a meeting chaired by Marvin Schultis, a young farmer at Fairbury, Nebraska.

The first officers were: Marvin Schultis, Fairbury, president; Marlin Frenzen, Fullerton, vice president; Kermit Bohling, Hooper, secretary; William Perrin, Schuyler, treasurer; Jack Underwood, Exeter, reporter; Burneil Gingery, Lincoln, executive secretary; and Glen Strain, Lincoln, advisor.

Among several goals are the development of competent, aggressive rural agricultural leadership and strengthening the confidence of young men in themselves and in their work.

An awards program was initiated in 1965 in four areas: livestock proficiency, crop proficiency, farm improvement, and outstanding chapter. The program has been underwritten by Ak-Sar-Ben and Farmland Industries.

Fifty-seven chapters have been chartered in Nebraska with a total membership of about 1,200. In 1980 Nebraska hosted the National Institute Conclave.

The Nebraska association is affiliated with a national association (4, pp 47-48).

Staff Recognition

Recipients of UNL Distinguished Teaching Award

Urban E. Wendorff - 1971 (also listed in Agricultural Engineering)
Allen G. Blezek - 1981
Laverne A. Barrett - 1986
Richard M. Foster - 1987

National Professional Society President

James T. Horner - president of the American Assocation of Teacher Educators in Agriculture - 1975.

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Chapter 5. Agricultural Engineering[1]

Contents

Names of the Department

Department of Farm Mechanics	1904-1909

(A section of the Department of Mechanical Engineering until 1908, when it became an independent department.)

Department of Agricultural Engineering	1909-present

No record was found of action to change the department name, but the agricultural engineering course of study was approved by the Board of Regents on April 12, 1910 (1, p 3).

Administrators

Name	Title	Period Served
J. B. Davidson	In charge	1904-1905
L. W. Chase	In charge	1905-1908
L. W. Chase	Head	1908-1919
L. W. Chase	Chairman	1919-1920
Oscar W. Sjogren	Chairman	1920-1929
Elmer E. Brackett	Chairman	1929-1946
Lloyd W. Hurlbut	Chairman	1947-1965
John R. Davis	Chairman	1966-1967
Robert W. Kleis	Chairman	1967-1968
William E. Splinter	Chairman	1968-1977
William E. Splinter	Head	1977-present

In a summary of the development of the Department, G. M. Petersen wrote: ". . . it seems apparent that Davidson started the Department of Farm Mechanics in 1904 and left in 1905, at which time Chase took over. That Chase was not officially appointed to the position of assistant professor in farm mechanics until 1906 would indicate that, through the 1905-06 year, Chase was 'acting' in the Farm Mechanics Department while officially in the position of instructor in mechanical engineering. However, since the Farm Mechanics Department was at that time an adjunct of Mechanical Engineering, this is reasonable" (1, p 2).

Location of Headquarters

Mechanic Arts Hall	1904-1905
Machinery Hall	1905-1918
Agricultural Engineering Building (L. W. Chase Hall since 1982)	1918-present

The Department of Farm Mechanics, established in 1904 as a section of the Mechanical Engineering Department, was first housed with its parent department in Mechanic Arts Hall on the City Campus[2] (2). In 1905 L. W. Chase, who then headed Farm Mechanics, supervised the design and construction of Machinery Hall east of the site of the present Plant Industry Building on the East Campus (3). For a short time in 1904, Chase had an office in the old Horticulture Building located where the Plant Industry Building now stands.

In his book, "These Fifty Years," R. P. Crawford wrote that "In the summer of 1904, the Board of Regents set aside $15,000 for buildings and equipment at the college farm. This money was expended in the erection of a machinery hall and shops buildings . . . at a cost of $10,500, and in equipping the blacksmith shop" (4, p 94).

[1]The authors gratefully acknowledge the assistance of William E. Splinter, Deon D. Axthelm and others in the Department of Agricultural Engineering in the writing of this chapter.

[2]Mechanic Arts Hall, built in 1897, was renamed Stout Hall in 1953 (8) for O. V. P. Stout, the University's first agricultural engineer who later became dean of Engineering. The building was razed in 1974. Manter Hall of Life Sciences was built on the same site in 1977.

Farm Mechanics, and later the Department of Agricultural Engineering, occupied Machinery Hall[3] until 1918 when the Agricultural Engineering Building was constructed at the north end of the East Campus mall. This building was also designed by L. W. Chase.

Important improvements in the Department's facilities were made at the beginning of this decade. Construction of the Agricultural Engineering Laboratory Building north of the Tractor Test track was completed in 1980, and a major renovation of the Agricultural Engineering Building was finished in 1981. Construction of the laboratories and renovation gave the Department over 80,000 square feet of office and laboratory space for teaching and research. The building was dedicated as L. W. Chase Hall on March 18, 1982.

Early History

Although agricultural engineering did not become a department by that name until 1909, the discipline had taken root at the University before the turn of the century. O. V. P. Stout, a civil engineer, was hired by the Agricultural Experiment Station in 1895 to conduct research in irrigation. His University title was agricultural engineer, the first such use of that professional title (3). Even Stout, however, was not the first Experiment Station professor to give some attention to irrigation.

Eight years before Stout's arrival, the first Experiment Station budget included $60 "for the study of the problem of irrigation" (5). This money apparently was used to defray the expenses of a trip by Lewis E. Hicks — the Station geologist — to study the potential of irrigation in western Nebraska. Hicks' observations during the trip were the basis for the first station bulletin — *Irrigation in Nebraska*, published in October 1887[4].

Without the $60 inducement in the Station budget, Hicks may not have presented his findings through the Experiment Station — or even at all. He wrote in the bulletin that his "belief and conviction (in irrigation) would of themselves have prompted me to publish the results of my trip; but I am impelled thereto by the additional consideration that the expense of my trip was defrayed by the agricultural experiment station connected with the University of Nebraska."

Hicks offered this prophetic observation on page 1 of his bulletin: "I am convinced that the wealth and resources of western Nebraska will be largely increased and its development greatly quickened by an intelligent and persevering use of the pure and copious streams of water flowing over it" (6).

Charles Russ Richards, a mechanical engineer, was listed as professor of practical mechanics on the School of Agriculture[5] staff from 1898 through 1904 (1). Through their formal contacts with agriculture, according to the dedication brochure for L. W. Chase Hall, "Richards and O. V. P. Stout . . . recognized a need to develop a branch of engineering devoted to the problems of crop and animal production. A division of Farm Mechanics was organized (in) the Mechanical Engineering Department with J. B. Davidson as chairman in 1904. Davidson left in 1905 to join Iowa State College in developing a program in agricultural engineering" (3).

In 1908, Richards became dean of Engineering. He was followed as dean by Stout (3). Richards Hall on City Campus was named in honor of Charles Richards.

Davidson, called the "Father of Agricultural Engineering", served as the first president of the American Society of Agricultural Engineers when it was organized in 1907.

For early leadership in developing the profession of agricultural engineering, Stout was awarded the first McCormick Gold Medal, the highest award in ASAE. Davidson received the McCormick Gold Medal the second year (3).

Present Administrative Organization

When Farm Mechanics became a department independent from Mechanical Engineering in 1908, the Board of Regents specified that it would be "subject, however, to the associate dean of Engineering in the arrangement of courses of instruction and to the associate dean of Agriculture in general administration" (2, p 3).

The Agricultural Engineering Department is administered today in essentially the same format as set forth in 1908. The undergraduate engineering teaching program is administered by the College of Engineering and Technology. The mechanized agriculture program, developed at the University of Nebraska by John J. Sulek, is administered by the College of Agriculture. Research, extension and the budgets are the responsibility of IANR (3).

[3]Machinery Hall later housed the Animal Science Meat Laboratory and was known by that name. During the thirties and early forties the Department of Home Economics maintained its equipment laboratory — directed by Arnold E. Baragar — and a classroom on the upper floor of the building. In 1952 it became the Chemurgy Building and was headquarters for the Chemurgy Department. Maps in University catalogs show that between 1921-22 and 1930-31 it was called "Stores and Gymnasium Building", "Stores," and "Old Machinery Hall." The building was razed in 1964. The present Loeffel Meat Laboratory was built just south of Marvel Baker Hall in 1954 (9).

[4]The 36th Annual Report of the Experiment Station, in a listing of Station publications, gives 1888 as the year *Irrigation in Nebraska* was published (7) and this date has been generally accepted. However, the cover of the bulletin itself shows October 1887 as the date of publication.

[5]An agricultural high school — later to include home economics. Members of the faculty were drawn from the College of Agriculture.

Teaching

The first teaching in the newly established Department of Farm Mechanics was provided by its chairman, J. B. Davidson, in 1904. A graduate of the University of Nebraska in Mechanical Engineering, Davidson gave instruction in forge work, farm machinery, and farm motors (4, p 94).

Davidson's successor, L. W. Chase, developed a program of instruction consisting of four years of mechanical engineering and one year of agriculture, from which three men graduated in 1909. One of these was Laurence F. Seaton who became a University of Nebraska operating superintendent and for whom Seaton Hall, one of the buildings of the Selleck Quadrangle on the City Campus, is named.

An agricultural engineering degree program was initiated in 1908, the year that Farm Mechanics became a separate department (3), and for the first time a separate departmental listing for farm mechanics appeared in the University Catalog (1907-08, p 232). This was two years before the University Regents approved an agricultural engineering course of study (1, p 3).

Only one course — a three-credit offering in farm machinery[6] — was included that first year. But the catalog for 1908-09 (pp 203-204) showed a much broader listing. In addition to Farm Machinery, it included Farm Motors, Rural Architecture, and Farm Drainage and Rural Highways.

The 1909-10 catalog (page 257) carried this statement — after the fact — about the new course of study: "Now part of Agricultural Engineering. This work has formerly been under the heading 'Farm Mechanics' but with the increasing demand for men in this work and the broadening of the course, it has been deemed best to change the title of the Department to Agricultural Engineering."

The first graduates in the agricultural engineering degree program — in 1912 — were C. D. Kinsman, E. B. Lewis and Ivan D. Wood (1, p 4). Wood received the first master of science degree in agricultural engineering in the United States from the University of Nebraska in 1914, and in the same year became the University's first extension engineer. In 1934 Wood became supervisor of ECW camps, in 1935 chief engineer of the Shelterbelt project, and later still, leader of USDA extension programs in irrigation.

In 1971, a doctor of philosophy program was established in the Agricultural Engineering Department as a component of the College of Engineering and Technology Unified Doctor of Philosophy program. In 1977, a master's program in mechanized agriculture was authorized.

An agricultural engineering curriculum established in 1937 at the University of Nebraska was one of the first three accredited engineering programs in agricultural engineering (3).

From 1913 through 1984, 155 master of science degrees in agricultural engineering were awarded; 30 master of science degrees in mechanized agriculture were awarded from 1976 through 1984.

Twenty-three engineering doctor of philosophy degrees were awarded between 1976 and 1984.

Student Clubs

The Agricultural Engineering Student Branch of ASAE. The student branch of the American Society of Agricultural Engineers was organized nationally at the University of Nebraska in 1913 with O. W. Sjogren as president. As of 1984, the Nebraska chapter had won the Engineering Week competition at the University 11 out of the last 14 years (3).

Alpha Epsilon, a national honorary for agricultural engineering students was established at the University of Nebraska in 1967. The members have been active in encouraging academic excellence among agricultural engineering students and in providing leadership with other organizations (3).

The Mechanized Agriculture Club, established at Nebraska in 1972, has had outstanding leadership. In 1980, it was designated the top club in the United States. It has been successful in state, regional and national minitractor pull contests (3).

Alpha Mu, the mechanized agriculture honorary, was established at the University of Nebraska in 1983.

Research

The Agricultural Engineering Department has a long history of involvement in irrigation technology. Ivan D. Wood was one of the originators of the siphon tube; Paul E. Fischbach - the automated gated pipe, computer scheduling of irrigation and the use of photovoltaics to pump water for irrigators. George Meyer developed the first automated, computer controlled remote irrigation system encompassing plant growth models and the determination of evapotranspiration using an automated weather station.

The till-plant system was originated by Lloyd W. Hurlbut as was the mounting of corn picker heads on combines. The rainfall simulator developed by Norris P. Swanson (USDA) is used as a research tool in several other states and foreign countries in studies of soil erosion.

George M. Petersen conducted some of the earliest studies on the natural air drying of grain. Otis E. Cross and Norman C. Teter developed the first swine housing unit integrating active and passive solar heating systems.

Stuart O. Nelson (USDA) and LaVerne E. Stetson (USDA) conducted pioneering studies on the dielectric properties of grains and insects. James A. DeShazer's research with animal calorimetry served as the basis for the development of computer models of

[6]The course covered "all lines of agricultural implements, tillage, grading, harvesting and fertilizing machinery, barn equipments, pumps, windmills, steam boilers, steam and gasoline engines, etc."

animal performance as a function of diet and weather. Dennis Schulte coordinated the Energy Farm research program which encompassed studies of on-farm alcohol production, methane generation, solar heating and computerized energy management.

Thomas L. Thompson was co-originator, with James C. Kendrick of agricultural economics, of the AGNET computer network in Nebraska which provides management models and weather data to farmers and farm managers.

Food processing is one of the newer areas of research with studies of food extrusion and processing being conducted by Milford Hanna.

Staff members whose primary assignments have been in research and/or instruction and whose service spanned 25 years or more are: Elmer E. Brackett, Morton Paul Bruning, Marion G. McCreight, Milo L. Mumgaard, John D. Parsons, Clarence A. Penton, George Petersen, William J. Runnalls, H. Hollis Shull (Panhandle Station), Chauncey W. Smith, Bertrand R. Somerhalder (North Platte Station), G. W. Steinbruegge, Norris P. Swanson, Kenneth Von Bargen, Urban E. Wendorff, Howard D. Wittmuss, and Francis D. Yung.

Extension

The Department has a long record of comprehensive programs in extension beginning with Ivan D. Wood, the first extension engineer so designated in the U.S. The irrigation extension programs have been strong and statewide with faculty located in each of the districts. The irrigation short course has been a successful program since it was originated by Paul E. Fischbach in 1956.

Building an A-shaped farrowing house at an extension demonstration on the Johnson County farm of Leonard Lawrence, February 28, 1928.

Farm safety has been a major thrust of the extension program since the '50s and it has been brought to national prominence by Rollin D. Schnieder who serves as national coordinator of Cooperative Extension safety programs in addition to his Nebraska duties.

The livestock housing program has a significant history dating back to model farm buildings developed by Ivan D. Wood. E. A. Olson was instrumental in introducing tilt-up concrete construction of farm structures. Jerry Bodman has been most successful in introducing solar energy to the design of commercial swine housing units.

Soil conservation programs have major emphasis under Howard D. Wittmuss, who designed and installed some of the first steep back-slope terraces at the Rogers Memorial Farm, and Elbert Dickey, who is using a rainfall simulator as an on-farm educational tool.

Staff members whose primary assignment was in Extension and whose tenure with the UN was 25 years or more are: Deon D. Axthelm, Paul E. Fischbach, Lester F. Larsen, E. A. "Olie" Olson, Rollin D. Schnieder, John C. Steele, and Ivan Wood.

International Programs

The agricultural engineering department has been closely involved in the University's international programs. John Steele was with the UN Technical Assistance Program in Turkey from 1956 to 1958 and again from 1962 to 1964 and was instrumental in setting up the agricultural engineering programs at Ataturk University. Several faculty were involved with the UN Mission in Colombia, helping to develop agricultural engineering programs at Bogota, Medellin and Palmira from 1966 to 1972.

Individual Recognition

Staff

Membership in the National Academy of Engineering:

William E. Splinter[7]	1984

Appointed to UNL Regents Professorship:

William E. Splinter	1984

Recipient of the UNL Distinguished Teaching Award:

Donald W. Edwards	1970
Urban E. Wendorff (also listed in Ag Education)	1971
Leonard Bashford	1977
Jack Schinstock	1985

[7]Splinter is the only UN staff member ever elected to membership in the Academy.

Chosen by former students as having the greatest impact on their lives, in response to a request which appeared in the Winter 1983 issue of the *College of Agriculture Alumni News:*

Chauncey W. Smith

Recipient of the UNL Distinguished Education Service Award:

Rollin D. Schnieder	1983

Recipient of the USDA Distinguished Service Award:

Rollin D. Schnieder	1984

Received the United States Presidential Award for Energy Efficiency:

Paul E. Fischbach	1980

Served as President of the American Society of Agricultural Engineers:

J. B. Davidson (then at Iowa State College)	1907-1908
L. W. Chase	1913-1914
Oscar W. Sjogren	1926-1927
Elmer E. Brackett	1940-1941
Lloyd W. Hurlbut	1960-1961
William E. Splinter	1978-1979

Alumni

Recipient of Honorary Doctorate Degrees bestowed by the University of Nebraska:

Ivan D. Wood	1954
Arthur W. Farrall	1955
Richard A. Schleusner	1984

President of the South Dakota School of Mines and Technology, Rapid City:

Richard A. Schleusner	1976-1986

Served as President of the American Society of Agricultural Engineers:

Arthur W. Farrall	1962-1963

Served in the Nebraska Legislature

Howard Lamb	1977-present
Don Eret	1983-1986

Tractor Testing

Buying a farm tractor in Nebraska — or any other state — was a risky investment before 1920. By this time the American farmer was definitely tractor-minded. Unfortunately, the some 160 tractor companies then doing business were far from uniform or dependable in the efficiency and durability of their engines and in the kind of servicing they were prepared to offer.

"Traction power for farming was here to stay, but many of the machines furnishing this power, because

Agricultural Engineer Lester F. Larsen with a Heider tractor that was tested at the UN laboratory in 1920. This model is now in the University's Tractor Museum on East Campus. It was donated by Warren LeFever of Geneva, NE.

of their poor performance records, were doomed to go," according to an article in the March 1942 issue of *The Nebraska Scholar* (10).

L. W. Chase called public attention to the farm tractor problem in 1917. He had served as one of three judges for the Winnipeg Motor Contests, held in Winnipeg, Canada before World War 1, and he also assisted with plowing demonstrations at Fremont, Nebraska in 1915 and 1916, which were similar to the Canadian matches.

In a 1917 address to the Nebraska Tractor and Threshermen's Association in Lincoln, Chase told members that unless tractors were made more dependable and claims for performance more reasonable, farmers would insist on some regulatory measure. Many farmers had purchased tractors after flowery claims. Soon afterward they realized their mistake. There was no dealer, no representative, and in many cases, no company to say nothing of a total absence of parts. There were some good tractors and some good companies, but many more that were not so well thought of (11).

A bill passed by the 37th session of the Nebraska Legislature (1919) had a significant part in making American tractors more reliable. It was introduced to "provide for official tests for . . . traction engines in the State of Nebraska and to compel the maintenance of adequate service stations for same" (10).

Specifically, the bill provided (a) that a stock tractor of each model sold in the state shall be tested and passed upon by a board of three engineers under State University management, (b) that each company, dealer or individual offering a tractor for sale in Nebraska shall have a permit issued by the State Railway Commission, and (c) that a service station with a full supply of replacement parts for each model of tractor shall be maintained within the state and within reasonable shipping distance of customers (11).

Logically, the new testing job fell to the University's

Department of Agricultural Engineering.

According to *The Nebraska Scholar*, exponents of the bill said it "would encourage the manufacture and sale of better tractors; it would also rectify and control certain practices detrimental to producer and consumer alike. The detrimental practices were largely the procedures of get-rich-quick, fly-by-night companies with which the production of good tractors was only incidental to their own interests" (10).

Three men who originated the idea and drafted the bill were chiefly responsible for a law that has withstood the test of time. W. F. Crozier of Osceola, then a representative in the Nebraska Legislature, introduced the bill. Charles Warner of Waverly, then a state senator, helped to get the test bill through the Senate with only one dissenting vote. L. W. Chase, then head of the Department of Agricultural Engineering, amended the bill several times after the first draft. He incorporated most of the details concerning the test that are still in the statutes (11).

"Little did (these men) realize how far-reaching this law would become," wrote Lester F. Larsen[8] in the October 1957 issue of the *Nebraska Alumnus*.

In 1956, the Nebraska tractor testing code was officially adopted as the national tractor testing standard by the Society of Automotive Engineers and the American Society of Agricultural Engineers. The organizations had been assigned the task of defining the U.S. Standards.

By this time, Australia and Italy had adopted the Nebraska tractor testing procedures and the Nebraska test was proposed as the official international code (12). It now serves as the basis for the OECD[9] test code.

The Nebraska tests did make a difference in the quality of tractors that manufacturers turned out. In 1927, Oscar W. Sjogren, then chairman of the Tractor Test Board, reported that "A general improvement in operation and design is noted in all the later tractors. Practically all now employ air cleaners and enclosed gears as a protection against effects of dust, and show also, that considerable attention has been given to the simplification of design and improving ease of operation and of servicing" (13).

E. J. Baker of Chicago, Editor of *Farm Implement News*, praised the Nebraska tractor testing service in the January 1956 issue as chiefly responsible for the rapid improvement in the manufacture of tractors. Baker added, "If the automobile industry had had the equivalent of Nebraska tractor tests to reveal the engineering standards of its products, the 1956 models, we suspect, would be quite different (in fuel economy) from those on the market today" (12).

[8]Larsen was engineer-in-charge, Tractor Testing Laboratory, from 1946 to 1976.

[9]Organization for Economic Cooperation and Development.

Test Course Improved in 1956

The Winnipeg and Fremont events, for which Chase served as a judge, were held under actual field conditions which varied widely. From the start the Nebraska Tractor Test Laboratory utilized an earthen test course. Larger and faster tractors made it necessary to improve the original course, and in 1956 two new tracks were built to replace the single earthen course. One track is of dirt and an inner track was constructed with concrete. Steel wheeled or track type crawler tractors were tested on the earthen course. The concrete test course is used for rubber tired tractors. The concrete pavement makes it possible to test rubber tired tractors with more consistent results (14). From 40 to 45 tests are conducted each year.

Tests include drawbar horsepower, belt horsepower, slippage, engine compression and fuel consumption per horsepower hour. In 1971, additional test categories were developed to evaluate a tractor's upset resistance, and its noise level.

The test laboratory is self-supporting. The state financed the facility, but all operational costs, including salaries, are covered by the fees charged to tractor manufacturers whose equipment is tested. Fees are based on a formula using the tractor's horsepower and engine features.

Tractors from many other countries arrive at the Tractor Laboratory for testing and acceptable performance approval. The first Soviet manufactured Belarus MTZ 80 was tested at the laboratory in 1973. Foreign tractors are tested at the laboratory even when manufacturers do not intend to sell their models in Nebraska, according to Louis Leviticus, now engineer-in-charge. The credibility of the laboratory's results is so important that companies consider the Nebraska test good advertising. Many countries will not allow import of tractors without test certification from Nebraska (15). *Popular Science* magazine has referred to the Laboratory as "the supreme court of tractors" (16).

Despite its years of unquestioned leadership in tractor testing, the Nebraska Laboratory was fighting for survival in 1987. In 1986, the Legislature repealed the 1919 law requiring all tractors sold in Nebraska to be tested by the University. A new law, LB 768, allows any tractor to be sold in the state if it has been tested by a station approved by the Organization for Economic Cooperation and Development — a 24-nation group organized by the Marshall Plan after World War II (21). However, at this writing it appeared possible that the United States would join the OECD testing program, and that the University of Nebraska would be selected to conduct OECD tests for the United States (22).

Tractor Power and Safety Day

The Nebraska tractor tests were the basis for a significant educational show for farm operators. An annual "Tractor Day," originated by Lloyd W. Hurlbut

in 1952 (17), was first held on East Campus but was later moved to the UN Field Laboratory at Mead after that facility was acquired by the University in 1962.

Traditionally, the field day was highlighted by a parade of new tractors tested at the University's tractor testing laboratory. The Tractor Day program was soon expanded to include displays and demonstrations of other farm machinery, and the event was renamed "Tractor Power and Safety Day."

The first Tractor Days were held on the campus mall south of the Agricultural Engineering Building, under some protest by the campus upkeep staff who were concerned about trampling of the grass by the large crowds attending the event. Later the program was moved to the concrete test course, built northwest of Agricultural Engineering in 1956, and then to the Field Laboratory at Mead.

From the beginning, tractor safety was emphasized. According to a *Lincoln Journal* report of the first field day in 1952, D. A. Kitchen, extension engineer, "showed farmers just what could happen to them if they didn't use common sense and safety rules while (operating) a tractor" (18).

Guided by remote control, and with a dummy operator named "Jughead," a tractor was tipped over backwards due to an improper hitching load. In another demonstration, the tractor was placed with the back wheels in a ditch. Again the tractor tipped over and "Jughead" was crushed. "Jughead" and the safety demonstration became a regular feature of succeeding tractor days.

Eventually machinery and other displays involved nearly every aspect of Nebraska agriculture. University home economists also presented demonstrations for homemakers. The theme for the 1970 program was "The Family and the Farm" (19).

Some 3,000 people came to the campus for the first field day. In later years, crowds exceeding 10,000 were common. Church groups, 4-H clubs, FFA chapters and other groups did a brisk business in selling ice cream, cold drinks, pie and sandwiches.

Delbert E. Lane, extension agricultural engineer, coordinated Tractor Power and Safety Day from 1965 to 1974. Rollin D. Schnieder, extension safety specialist, then coordinated the program until 1983.

In 1984, a new event — "IANR Ag Expo" — took the place of Tractor Power and Safety Day. That year emphasis was on animal agriculture. In 1985, crop production was emphasized and the last vestiges of Tractor Day disappeared.

IANR Ag Expo was organized to broaden participation by IANR departments and to showcase research at the UN Field Laboratory at Mead.

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Chapter 6. Agronomy

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Department of Agronomy and Department of Experimental Agronomy (3, 1911-12, p 299)	1911-1912
Department of Instructional Agronomy and Department of Experimental Agronomy (3, 1912-13, pp 317, 321).	1912-1913
Department of Agronomy, Instructional, and Department of Agronomy, Experimental (3, 1913-14, p 357)	1913-1916
Department of Agronomy (7, Mar 15, 1916, p 367) (3, 1915, p 149).	1916-present

Principal Administrators

P. B. Barker, Head, Agronomy Instructional	1914-1916
T. A. Kiesselbach, Head, Agronomy Experimental	1914-1916
William W. Burr, Head	1916-1919
William W. Burr, Chairman	1919-1932
Franklin D. Keim, Chairman	1933-1952
Elvin F. Frolik, Chairman	1952-1955
Donald G. Hanway, Chairman	1955-1965
Francis A. Haskins, Interim Chairman	1965-1967
Donald G. Hanway, Chairman	1967-1976
Francis A. Haskins, Interim Chairman	1976-1977
Robert G. Gast, Chairman (Head 1977)	1977-1983
David P. McGill, Interim Head	1983-1984
Darrell W. Nelson, Head	1984-present

Other Administrators

Franklin D. Keim, Associate Chairman	1930-1932
Donald F. Burzlaff, Vice Chairman	1973-1974
David T. Lewis, Vice Chairman for Research	1974-1976
Lowell E. Moser, Vice Chairman for Instruction	1974-1976
Waldemar J. Moline, Vice Chairman for Extension and Outstate Programs	1974-1976

Physical Location

Headquarters

Experiment Station Hall	1899-1933
Plant Industry Hall	1933-1952
Keim Hall	1952-1978
Plant Science Hall	1978-present

Other Buildings Used

Livestock Judging Pavilion (seed storage, office and teaching space)	1908-1932
Dairy Industry Hall (offices and classrooms)	1917-1933
Crops Laboratory (T. A. Kiesselbach Crops Research Laboratory) (seed processing, classrooms, laboratories)	1933-present
Chemurgy Building (chemurgic crops program)	1943-1964
Foundation Seed building, 3115 No. 70 St.	1955-present
Paul H. Stewart Seed Laboratory (drying, processing and storage)	1969-present

Field Research Facilities

The "model farm" (at the State Fair Grounds)	1873
East Campus (varying areas and amounts)	1874-present
Agronomy Farm	1918-1963 (some portions to present)
Dalbey-Halleck Farm	1944-1959
South Genoa Farm	1949-1966
North Genoa Farm	1949-present
Veterans Hospital land	1951-1973
Field Laboratory at Mead	1962-present

Early History[1]

In Nebraska, agronomy did not become recognized as a name of an agricultural science until after 1900. The word "agronomy" will not be found in the early documents of the College of Agriculture. Many of the activities carried on by the College in its early years, however, related to evaluation of crops and crop varieties, crop production practices, and management of soils. These areas of study were considered to be a part of "agriculture" which term initially also included livestock raising, dairying, horticulture, and the related areas of entomology and animal diseases.

[1]The authors gratefully acknowledge the assistance of Donald G. Hanway who wrote the original draft of this Chapter, after he had spent much time in reviewing relevant documentary materials. Inasmuch as the authors made numerous changes and deletions in, and additions to, Hanway's manuscript in order to bring it into conformity with the general plan of this *History*, they take full responsibility for the write-up.

Early Work at the University

The first University agricultural land, the "model farm" was in the vicinity of the present state fairgrounds. Crops grown during the first year of operations were corn, wheat, oats, sugar beets, garden vegetables and experimental plots of wheat, barley and oats (1, pp 22-24).

In 1874 the College Farm (now East Campus) was purchased from Moses M. Culver. In 1875 "Professor Thompson reported there were 171 acres of crops 'now in the ground' including 55 acres of wheat, 18½ acres of oats, 19½ acres of barley, 68 acres of corn, 3 acres of broomcorn, 1 acre of sugar beets, and 6 acres of miscellaneous crops" (1, p 28).

Establishing a Department

In 1901 the only components of the broad field of agriculture remaining in the Department of Agriculture of the College were courses and investigations

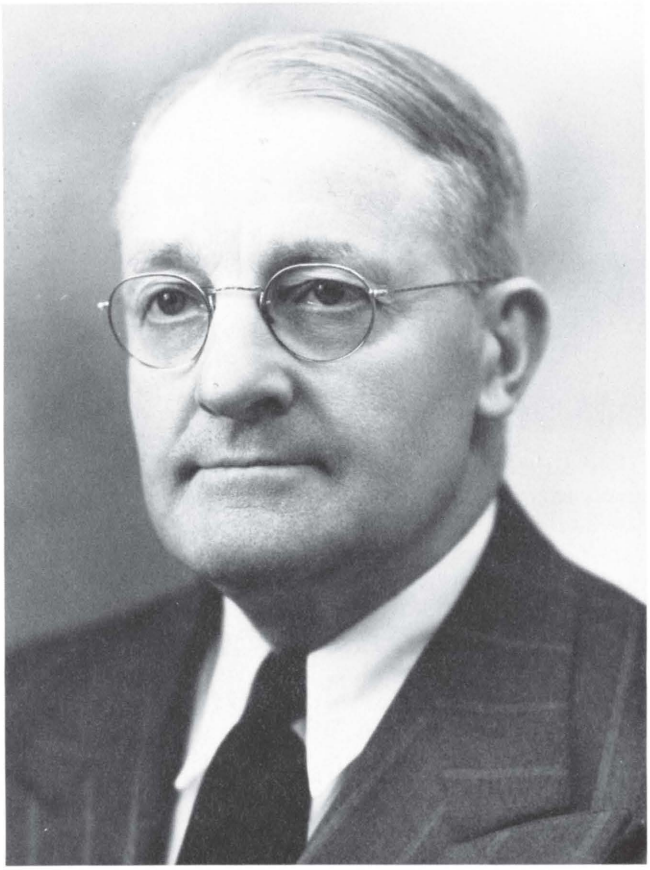
relating to field crops and soils. But, in general usage, the word "agriculture" included the broad spectrum of field crop and livestock production and related activities.

For the first time the University of Nebraska catalog for 1905-1906 listed a Department of Agronomy with three staff members: T. L. Lyon, Alvin Keyser, and E. G. Montgomery (3, p 197). Their offices were in Experiment Station Hall.

A permanent Department of Agronomy was not assured by its listing in the 1905-1906 University catalog. The twentieth annual report of the Station for 1906 stated "Professor T. L. Lyon resigned September 1906, as Professor of Agronomy, and the department was divided, establishing a Department of Soils and a Department of Field Crops. Alvin Keyser was elected adjunct professor of field crops; in charge of both instructional and Station work" (5, 1907, p 8).

On June 2, 1909, the *Nebraska Farmer* reported that the Departments of Field Crops and Soils were abolished stating that they were combined into one Department of Agronomy with two divisions (7, 1909, p 552).

The 1908-1909 University catalog gave the staff of the Department of Agronomy and Farm Management as C. W. Pugsley, (E. G. Montgomery), P. B. Barker and Erwin Hopt. The staff for the Department of Experimental Agronomy was given as Montgomery, (Pugsley), and Hopt (3, 19098, pp 194, 196). Titles applied were a motley array; for Pugsley, professor of agronomy and soil agronomist; for Montgomery, professor of experimental agronomy; for Barker, adjunct professor of soils; and for Hopt, instructor in agriculture (3, 1908-1909, pp 26, 32, 35, 37).



F. D. Keim, chairman of the Department of Agronomy from 1932 to 1952, deserves much credit for Nebraska having one of the outstanding agronomy departments of the world. Under his leadership, the department made significant progress during difficult times.

The 1911-1912 Bulletin showed a Department of Agronomy and a Department of Experimental Agronomy (3, pp 296, 299). In 1912-1913, the names became Department of Instructional Agronomy and Department of Experimental Agronomy (3, pp 317, 321). In 1913-1914 the word sequences were changed to Agronomy, Experimental; and Agronomy, Instructional (3, p 357). Kiesselbach was listed as head of the Department of Agronomy, Experimental, with two staff, J. A. Ratcliff and C. A. Helm, all officed in Plant Industry Hall (3, pp 324-327). P. B. Barker was Head of the Department of Agronomy, Instructional, with a staff of Erwin Hopt, H. J. Young, and Franklin D. Keim (3, p 324-328). Barker and Young were officed in Experiment Station Hall. Hopt and Keim were in the Livestock Judging Pavilion.

The March 15, 1916 *Nebraska Farmer* announced: "The departments of experimental agronomy and instructional agronomy at the Nebraska agricultural college and experiment station have been combined and W. W. Burr of the United States Department of Agriculture has been chosen to head the new consolidated department" (7, p 367). Thus, it has remained.

Teaching

A Reputation for Excellence

Throughout its existence, the Department of Agronomy has maintained a reputation for excellence in its undergraduate teaching program. Franklin D. Keim, who served as department chairman from 1932 to 1952, excelled in attracting, supporting, encouraging, and placing bright young men in the field of agronomy. He selected highly capable, dedicated teachers for the lower level courses of high enrollment.

T. Homer Goodding, who was added to the staff in 1917, was primarily involved in undergraduate teaching and advising throughout his career to retirement in 1957. Many Nebraska farm boys entered the field of agronomy because of the personal attention received from Keim and Goodding.

Class Size

The agronomy building (Keim Hall), occupied in 1952, was planned with the concept of handling students in beginning field crops and forage crops in

multiple lecture sections of 35 to 40 and similar numbers in scheduled laboratory sections. This permitted Goodding and his teaching colleagues the opportunity to know and interact with individual students.

With the increasing enrollment that took place in the sixties, limiting lecture sections in lower level courses to 40 students was no longer feasible. Lectures were moved to the auditorium/classroom in Keim Hall which would seat 150.

William L. Colville, primarily responsible for the beginning crops course from 1957 to 1971, took the lead in developing rear-screen projection and audio systems that would serve all students comfortably in the large sections. To compensate for the loss of student-teacher interaction possible only in small lecture sections, he transformed the laboratory into an audio-tutorial system and increased the use of student laboratory supervisors.

Course Offerings

The 1920-21 College of Agriculture catalog listed 25 courses in Agronomy and a teaching staff of seven (4, pp 38-39). There was tremendous growth in the subject matter of agronomic science in the next half century resulting in need for more teachers and more courses. In the 1974-76 Catalog, 29 were listed on the teaching staff in agronomy and 54 courses were offered.

Graduate Programs

Summary of graduate degrees awarded through May 1985:

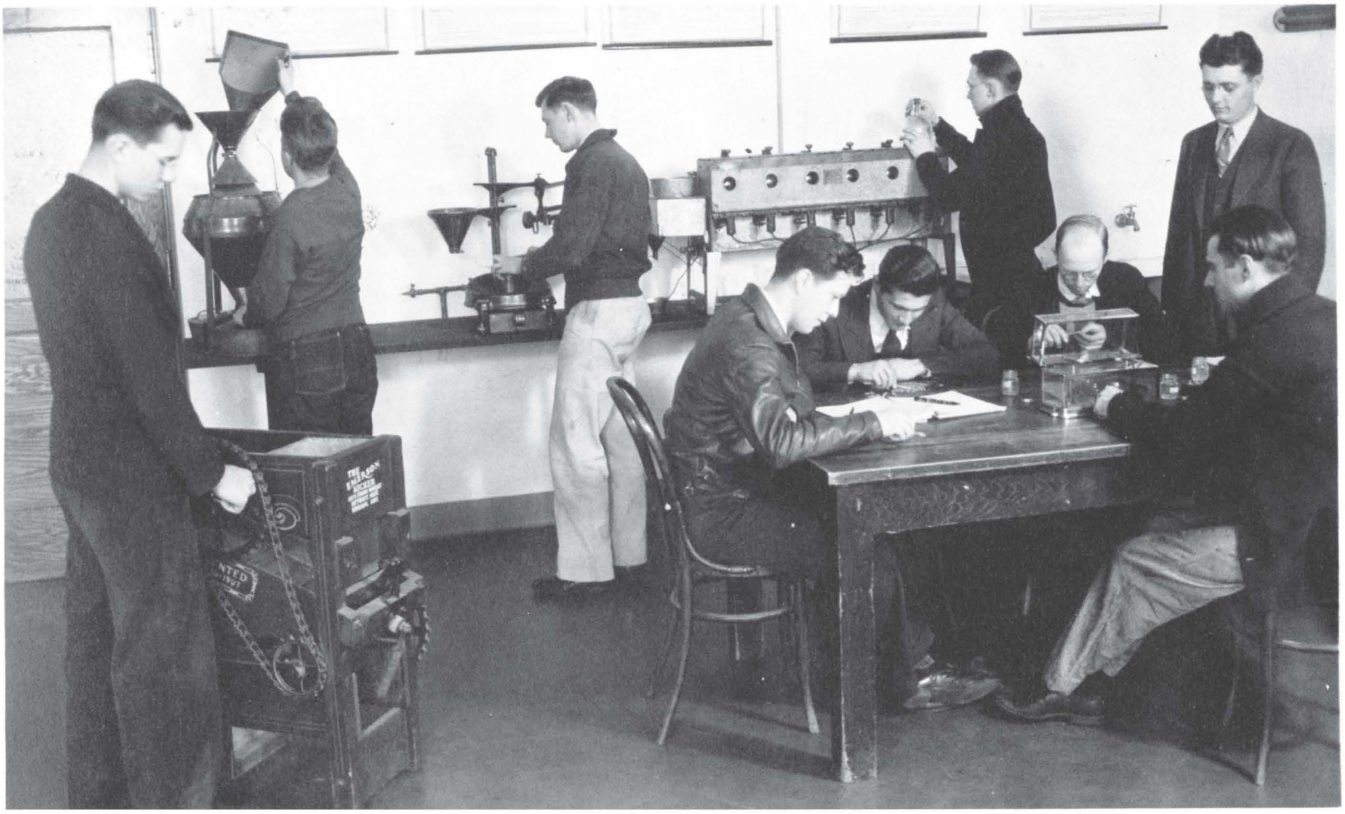
Master of Science	653
Doctor of Philosophy	290

At the 48th Annual Commencement on May 26, 1919, T. A. Kiesselbach was awarded the PhD in botany and agronomy, the first PhD identified with agronomy. Only seven PhD degrees were awarded from 1929 to 1935. Since 1935 the number of graduate degrees awarded has grown steadily averaging 18 MS and 10 PhD degrees annually from 1971 to 1980. Recipients represent countries in all parts of the world.

Departmental Student Clubs

Early Agronomy Clubs

In 1922 a student agronomy club elected Glen C. Cook, president; George F. Sprague, vice president; and Mr. Meade, secretary-treasurer. The report of the meeting at which T. A. Kiesselbach recounted some early campus history included the statement, "A group of students who were majoring in agronomy organized themselves into a club in 1920" (9, Oct 1922, p 19). This club was still active in the spring of 1924 (9, Apr 1924, p 21).



A grain grading class in the 1935-36 school year. Instructor Anton L. Frolik stands at right. Student with light trousers standing at the test weight apparatus is Robert L. Cushing, a member of the University of Hawaii Board of Regents from 1967 to 1974.

In November 1924 at a dinner meeting of staff and students, F. D. Keim proposed an "organization of agronomy men" with a graduate student for president, an undergraduate for vice president, and a faculty member for secretary-treasurer. The plan was adopted and M. D. Weldon was elected president; George W. Beadle, vice president; and F. D. Keim, secretary-treasurer (9, Dec 1924, p 21). Monthly dinner meetings were held, with faculty wives providing the food. This organization existed for several years (9, Mar 1926, p 20 and May 1929, p 8).

On April 11, 1931 four judging team members met under the chairmanship of Anton L. Frolik, judging team coach, to organize an agronomy club. The Club was organized with Glenn Burton, president; Melvin Husa, vice president; and Fred Siefer, secretary-treasurer. These students, along with Clifford Jorgensen were the charter members. Tri-K (Klod and Kernel Klub) was chosen as the name of the organization. Subsequently, ten other students were elected to membership (10, Apr 1931). Except for a break during World War II this club has continued through the years. In the fall of 1953 Tri-K merged with the much younger and smaller Soil Conservation Club to form the present Agronomy Club.

Student Section of the ASA

The American Society of Agronomy (ASA) in 1931 appointed a committee to consider the organization of a student section. F. D. Keim was a member of this committee, which in 1932 recommended that ASA authorize "a student section of the society to be composed of students in farm crops and soils and related fields". ASA appointed another committee to proceed with organization of a student section (11, 1932, pp 1009-1010). In 1934 ASA added the Nebraska Tri-K Club to the list of organized student sections to be effective January 1, 1935 (11, 1934, pp 1035-1036).

In 1933 the Student Section initiated an essay contest. Through the decades, many Nebraskans have won this contest or placed in the top ten.

In 1952 the Student Activities Section initiated a national agronomy achievement award contest for affiliated chapters, the award to go to the club with the best overall program. In 1953, second year of the contest, the Tri-K Club of Nebraska placed first (12, 1953, p 645). D. G. Hanway and Roy P. Matelski were advisers, and officers of the "best club in the nation" were John Stammer; Richard Wiese; Arthur Kuhl; Rolla Swanson; Howard Hall; and Dale Nitzel. Nebraska has the unmatched record of placing first as the best club in the nation for five consecutive years, 1973 to 1977.

Local Club Activities

The Agronomy Club has held regular monthly meetings to handle business, hear speakers, share in congeniality, and enjoy refreshments. For speakers at meetings the Club has brought in representatives from agribusiness and governmental agencies, people with firsthand information on career opportunities and other topics not usually covered in classes (13).

Since 1937 the Tri-K/Agronomy Club has sponsored a crop judging and identification contest for local students each spring (9, May 1937, p 12). The Club also sponsors local speech, essay, and photography contests. Winners receive awards at the spring banquet, and also represent the Nebraska Club at the national ASA contests with travel paid by a grant from the Knights of Ak-Sar-Ben in Omaha. The Club has also sponsored the soil judging team in regional and national contests.

Avenues used by the Club for raising funds were harvest and sale of Indian corn, subscription sales of *Crops and Soils* magazine, and operating concession stands at Farmers Fair, agricultural conventions, and Departmental field days. Sale of seed and plant samples of crops and weeds to schools and county Extension offices was an important service and a good money-raiser through many years. Sale of advertisements to agribusiness for the annual newsletter or yearbook paid for its printing and distribution.

The annual *Tri-K Newsletter* was first published in May 1949. In 1953 it became *Klod and Kernel* and from 1954 to 1957 *Seed and Soil*. It was then changed to *Agronomy Club Newsletter* and in 1974 to *Agronomy Club Yearbook*.

The name and membership of the Club have evolved to meet new needs, but the main objectives have held on course—to develop a spirit of fellowship among students and faculty members of the Department and to stress academic excellence and professional growth of undergraduates (13).

Research on Crops, Pastures and Range

Historical Background

Yield and acreages of primary crops grown in Nebraska are shown for 1920 and 1975 in Table 1 on the next page.

Corn

In 1949 T. A. Kiesselbach published Research Bulletin 161 *The Structure and Reproduction of Corn*. In the opening paragraph he stated, "Because of wide interest in the reproductive process in connection with breeding and genetic studies the floral development, fertilization, and embryology are especially stressed. The morphology and development of the vegetative organs are also included. The botanical relationship, origin, genetics and breeding of corn are briefly considered" (20, Res Bul 161, p 3).

In 1950 T. A. Kiesselbach published Research Bulletin 166 *Progressive Development and Seasonal Variations in the Corn Crop*. In this bulletin Kiesselbach made a critical analysis of climatic factors from 1902 to 1948 as they affected growing conditions and the growth

Table 1. Nebraska's primary crops in 1975 with comparisons for 1920 (8).

Crop	Harvested Acreage (000)		Yield (Bu. or T/A)		Production (Million Bu. or T.)	
	1920	1975	1920	1975	1920	1975
Corn for grain	7,660	5,920	33	85	254	503
Wheat	3,593	3,070	17	32	60	98
Soybeans	—	1,200	—	27	—	32
Sorghum for grain	22	1,900	20	55	.44	105
All hay harvested	4,755	3,950	1.2	1.65	5.8	6.5

and yield of corn plants (20, Res Bul 166, p 3).

Corn hybrids showed a yield advantage in tests and a potential for improvement not present in open-pollinated varieties. By 1947 the shift to hybrids was nearly complete. No longer would corn farmers be concerned about selecting and caring for their own seed corn. Commercial companies soon dominated the hybrid seed corn production picture. The challenge to a farmer became one of getting reliable data showing expected performance of different hybrids in his locality.

In 1943 John H. Lonnquist, employed as corn breeder (17), initially addressed two principal objectives. One was the development of inbred lines to be used in hybrids adapted to the western, more stressful fringe of the Corn Belt. The second was to study procedures for the genetic improvement of corn that would permit breeders to produce superior hybrids for the future. Five inbred lines and seven hybrids were released.

Lonnquist explored the possibility of developing synthetic varieties for farmer use (12, 41:153-156). His studies included evaluation of the potential of gametic sampling, recurrent selection, and convergent improvement procedures for improving germplasm sources as well as lines and hybrids.

C. O. Gardner returned to the Agronomy staff in 1952 (17). His capabilities in biometrics and quantitative genetics were a natural complement to Lonnquist's interests in improving corn breeding procedures.

With William Compton being hired as corn breeder in 1967 (17), the emphasis in the corn breeding project was shifted more to improving and releasing genetic resources, germplasm pools, and inbred lines with special attributes that could be used for improvements in hybrids coming from the private company breeding and testing programs (25).

Over the years research on corn addressed fertilizer, plant population, row spacing and other elements of the production system. The fact that in 1975 corn in Nebraska yielded 85 bushels per acre (see Table 1) was a great tribute to development of systems that integrate the research of breeders, soil and weed scientists, irrigation engineers, plant pathologists, entomologists, and others.

Soybeans

Soybeans have been the "Cinderella" crop in Nebraska as across the United States. The acreage in Nebraska for seed increased from 4,000 acres in 1940 to 1,200,000 acres in 1975 and 2,360 million acres by 1985.

T. A. Kiesselbach in 1915 summarized earlier tests with soybeans in Nebraska. He said that it was the most practicable of any annual legume for hay for cattle, hogs, and sheep (21, Bul 150, pp 7, 8). In 1940 farmers harvested 13,000 acres for hay compared to 4,000 for seed. Use for hay has since disappeared (8).

Nebraska in the 1940's initiated a limited breeding and production practices research program with soybeans (5, 1946, p 32; 1947, p 27). Growth in acreage across eastern Nebraska was slow, the rate increasing markedly in the 1960's and 1970's as farmers responded to extension efforts on production practices and as improved varieties became available from the state and regional programs. Recognition of the relative drought tolerance of soybeans and its great value

T. A. Kiesselbach, long-time professor of agronomy, was one of the world leaders in crops research during the first half of the twentieth century. He worked with all major field crops in Nebraska, but was most noted for his research on corn.

in rotation with grain sorghum and with corn stimulated production across eastern Nebraska. Both breeding and production practices research were increased.

James E. Specht and J. H. Williams, Nebraska soybean breeders, in a comprehensive analysis attribute about half of the soybean yield gain that has been made in Nebraska and the United States to genetic improvement, i.e., better varieties (30, Ch 3, p 49-74). Williams released the following varieties from the breeding project: Nebsoy, 1979; Mead, 1981; Platte, 1984; and Fremont, 1986 (42).

Wheat

Wheat has been an important crop in Nebraska since the days of settlement. The great advantage of Turkey winter wheat over spring wheats in Station trials in the 1890's showed the superiority of winter over spring wheat. In 1900 Nebraska had 800,000 acres of winter and 1,950,000 of spring wheat. By 1905 winter wheat had increased to 2,090,000 acres and spring wheat had dropped to 335,000 (8).

Through the 20th century wheat has probably been the most stable crop in Nebraska in terms of acreage.

J. W. Schmidt, in 1974, analyzed the importance of the Turkey variety and Turkey type wheats to Nebraska and the nation (27). He listed four phases of Turkey wheat improvement to that date in Nebraska. The first phase involved testing Turkey type wheats with only small difference noted in yields. In 1918 Nebraska 60 was released as superior.

The second phase included the period from 1920 to 1940. The Cheyenne variety selected from Crimean was released in 1930 and the bunt-resistant Nebred in 1938 (5, 1930, 1939). In the third phase hybridization led to the release of Pawnee in 1942. "Pawnee featured a combination of earliness and winter hardiness along with other important traits and added a new dimension to Nebraska wheat production" (27, p 161).

The fourth phase emphasized the need for stem rust resistant wheats. In 1963 the first stem rust resistant varieties released were Gage, Scout and Lancer. This was a major advance, for stem rust had caused great yield losses in certain years. Scout proved widely adapted and was extensively used in breeding programs in most Great Plains states. In 1968 four varieties developed by the Nebraska Experiment Station, Lancer, Scout, Warrior and Gage, accounted for 82 percent of the state's acreage (28). Centurk, another outstanding variety largely Turkey-derived, was released in 1971 (27, p 171).

The wheat breeding program has involved USDA breeders since 1930 when Coit Suneson was detailed to Nebraska (see "Federal Cooperation" in this chapter). John W. Schmidt, employed by the University in 1954 joined USDA employee Virgil A. Johnson in the wheat breeding program. The partnership "formed the nucleus of a team that would develop at UNL and establish its reputation as a leader in world wheat research" (29).

Rosalind Morris, cytogeneticist, in 1957 began to focus her research on wheat (5, 1957, p 6). In 1959 agronomy employed Paul Mattern, a wheat chemist in the Department of Agricultural Chemistry, to establish a wheat quality laboratory on the top floor of the Crops laboratory. His analyses permitted the breeders to study wheat protein and select for milling and baking quality in earlier generations, enhancing the rate of breeding progress (17).

In 1962 Schmidt and Johnson announced the discovery of the "missing link" in the development of hybrid wheat when they found genes that would restore fertility to male-sterile plants (31, 1962, p 6; 1965, p 1). Because of difficulties in production, hybrid wheat has not become important.

Grain Sorghum

The rapid transformation of sorghum from minor to major crop status in Nebraska occurred during the 1950's when scientists discovered a reliable male-sterile/fertility-restoring system that made commercial hybrids with greatly increased yields possible.

Robert L. Cushing was added to the agronomy staff in 1937 (first as a University and later as a federal employee) to expand breeding and improvement programs with grain sorghum (17). The USDA moved Orrin J. Webster from the North Platte Station to Lincoln in 1943 where he was given the sorghum breeding responsibility. While there had been earlier interest in sorghum hybrids and breeders had been intrigued by the potential of hybrids from observing outcrosses in their fields, the discovery of a Day male-sterile variety in Tennessee in the late 1940's by Glen H. Kuykendall was to set the stage for commercial hybrids (12, 44:369-373).

Webster obtained seed of the Day male-sterile and began to study its mode of inheritance. In 1951 he made a number of crosses, one of them being the Day male-sterile with Combine Kafir 60 (CK-60). When grown in the greenhouse, all F1 plants from the cross were sterile. By backcrossing to CK-60, a sterile or A-line of CK-60 was developed. Conversations in 1953 with LeRoy Quinby indicated that Texas had made parallel progress (23).

In 1965 the USDA employed Jerry D. Eastin to initiate a sorghum physiology research program at Lincoln (5, 1966, pp 3, 13). Subsequently, Eastin was employed by the University, but the USDA in 1972 replaced him with Charles Y. Sullivan and added a second physiologist, thus building Nebraska to a leadership position in sorghum physiology (17, 1967; 5, 1975, pp 4, 5).

Physiological studies showed that low night temperatures characteristic of the High Plains of western Nebraska greatly delay development of certain

sorghum genotypes but not others (33, pp 108-109). This has opened the way to breeding grain sorghums adapted to that area. Sorghum is destined to remain one of Nebraska's important crops.

USAID funds to support sorghum research were started in 1971. J. D. Eastin, Ralph B. Clark, W. M. Ross, C. Y. Sullivan, Charles Francis, and C. O. Gardner were participating scientists (47).

Range, Pasture, and Forages

Nebraska has roughly 23 million acres of range and pasture and the same amount of cropland (8). The Sandhills in north central Nebraska comprising over 14 million acres or 29 percent of the state's land are recognized as one of the most productive range areas of the world (22, 1934, pp 146-159). The production of range and pasture is marketed principally as beef cattle, primarily as the annual calf crop.

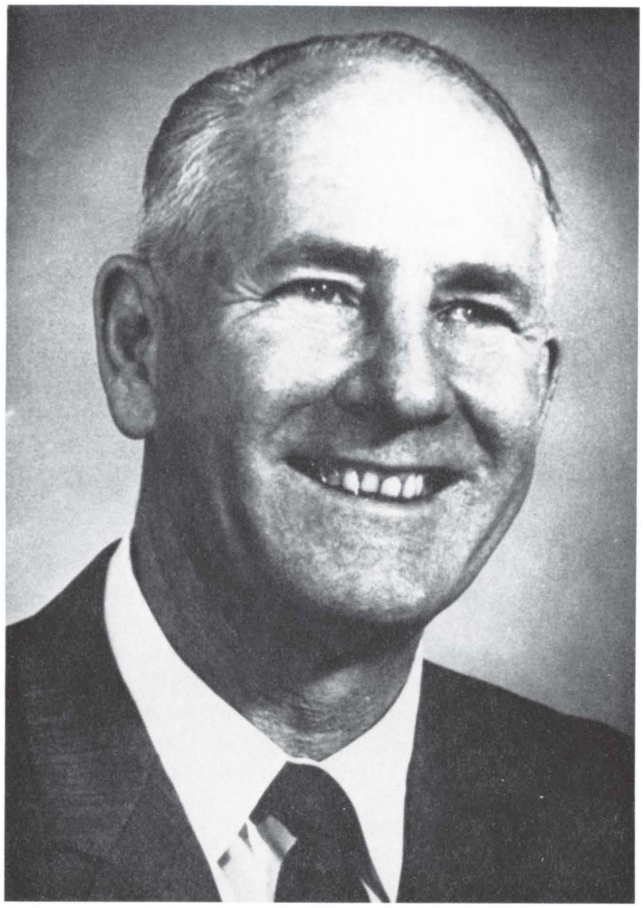
Cow numbers in Nebraska increased from 1,297,000 in 1930 to 2,409,000 in 1974 and the number of calves born from 1,016,000 in 1930 to 2,300,000 in 1974 (8). The weight of calves at weaning time has also been increasing.

The Nebraska Sandhills. F. D. Keim began to address range research needs in the 1920's. With Anton L. Frolik and George W. Beadle he published results of studies on prairie hay grasses in 1932 (20, Res Bul 65).

Frolik and W. O. Shepherd in 1940 reported on how vegetative composition affected grazing capacity (20, Res Bul 117). Shifting emphasis to improved management was essential because of severe deterioration due to drought during the 1930's and overgrazing that resulted. In 1942 T. E. Brinegar and F. D. Keim reported on Frolik's studies and a continuation thereof (20, Res Bul 123).

In 1953, D. F. Burzlaff was hired as range extension specialist. In 1957 he was stationed at the Fort Robinson Beef Cattle Research Station in northwest Nebraska as extension agronomist in range management so that he could readily travel much of the Sandhills range (17).

Working in close association with Soil Conservation Service technicians, Burzlaff initiated an intensive extension program for improvement of range production through improved management. He characterized three widely occurring range sites so that management recommendations could fit needs (20, Res Bul 206). He emphasized dividing large range pastures, distribution of salt, location of added windmills, and rotational or varied season grazing to assure restoration of plant vigor. In 1961 Burzlaff was moved to Lincoln to head a statewide program in range management extension. The condition of most sandhills rangeland has moved to good and excellent categories, while total calf weight has more than doubled (due in part to advances in management, breeding, nutrition and animal health).



George W. Beadle, a native of Wahoo, Nebraska, was a recipient of the Nobel Prize in Physiology and Medicine. An agronomy major, he was awarded 35 honorary degrees and became president of the University of Chicago. He ranks among the University of Nebraska's truly great alumni.

Eastern Nebraska Pastures. Settlers across eastern Nebraska plowed the better land and planted annual crops. Most pastures retained for livestock tended to be small and consisted of steeper, more erosive land. As commonly practiced, full season grazing soon largely eliminated warm season grasses. Many became weedy and bluegrass pastures were not very productive. E. C. Conard was detailed to agronomy in 1935 by the USDA Soil Conservation Service (SCS) with responsibility for Conservation Nurseries used to collect and evaluate various grasses and forbs for use in various revegetation programs, a great need because of widespread deterioration due to the drought (17). In 1945 he was appointed to a University teaching/research position in pasture management. Conard conducted grazing studies for many years on seeded cool season and warm season pastures at the Agronomy Farm near 70th and Adams Streets in Lincoln. Acquisition by the University of the Field Laboratory near Mead permitted the establishment of a more comprehensive set of research pastures for continuing studies.

Grass Breeding

The performance of "Hungarian Brome Grass" introduced from Europe in the 1890's attracted much attention (21, 1899 Bul 61). By the thirties, this grass became the most widely used grass in pasture plantings across eastern and central Nebraska. The Forty-eighth Annual Report of the Nebraska Agricultural Experiment Station stated, "It is estimated that the drouth of 1934 has destroyed three-fourths of the permanent pastures of this state that were planted to cultivated species. Owing to scarcity of seed of the most desired species, formulas for pasture mixtures are being prepared which will make the best use of available sorts. A general survey indicates that native pastures and meadows have not been so seriously injured and that native prairie grasses endure heat and drouth (sic) far better than bluegrass" (5, 1935, pp 12,13).

Laurence C. Newell (USDA) and Anton L. Frolik, collected seed from 40 farmer/bromegrass fields in Nebraska, tested the collections in experimental plots, and named the best type Lincoln bromegrass. The farmer fields of this type were the original sources of certified seed. The variety is still widely grown today.

From his grass breeding program, started in 1936, Newell released 16 cultivars (varieties) between 1936 and 1973.

Alfalfa

The alfalfa improvement program at Nebraska has been closely cooperative with the USDA since 1928 when H. M. Tysdal was detailed to the Department of Agronomy to conduct two projects, 1) study the soil moisture depletion problem with alfalfa, and 2) cooperate with George L. Peltier, Department of Plant Pathology, in research on alfalfa diseases, particularly bacterial wilt. One of Tysdal's major early contributions was to substitute crushing the roots of infected plants with a Waring blender and dipping the seedling roots in the inoculum suspension instead of using the traditional (much more tedious method) of inoculation. Tysdal also ascertained the importance of insect tripping of alfalfa flowers in seed production. The alfalfa variety Ranger selected by Tysdal from Cossack, Ladak, and Turkestan, was released in 1942 to meet the need for bacterial resistance." "Ranger . . . constituted about 30 percent of the national acreage during the 1950's" (34, pp 302, 39). It was probably the most widely grown alfalfa variety ever produced.

Ranger was a synthetic variety. The polycross breeding system (used in developing Ranger) originated by Tysdal became the basic standard procedure in intermating selections in cross-pollinating legumes and grasses. In 1972 C. H. Hanson indicated that "Most alfalfa varieties on the market today could be called synthetics. . ." (34, p 302).

The USDA continued to provide an alfalfa breeder in the Nebraska program until W. R. Kehr retired in 1983.

During the time that Kehr was in charge, the program resulted in developing principles of breeding alfalfa for hay, pasture, and dehydration. The by-products of the basic research program were the development and release of improved germplasm and varieties (four varieties were released).

Genetics—Research and Graduate Instruction

Genetics is one of the scientific disciplines that form a foundation for successful plant breeding. It is not surprising, therefore, that teaching and research in genetics have had a prominent role in agronomy programs at the University of Nebraska. Until the early 1950's the responsibility for instruction in genetics was carried primarily by F. D. Keim. Beginning in the fall of 1946, Elvin F. Frolik took over the graduate-level genetics course and also developed a course and research program in cytogenetics.

The period immediately following World War II saw great advances in genetics, and Keim and Frolik, in the late 1940's and early 50's sought to increase the emphasis on genetics in the Department of Agronomy. To do this, they hired M. Rosalind Morris (in 1947), Charles O. Gardner (in 1952), and Francis A. Haskins (in 1953) to provide basic support in cytogenetics, quantitative genetics, and biochemical genetics, respectively, for agronomy teaching and research programs.

Morris assisted Frolik in initiating a pioneering research program in 1947 to study the physiological, cytological, and genetical effects of thermal neutrons and x-rays on crop plants, with emphasis given to maize. After Frolik moved into administration, Morris initiated a wheat cytogenetics program in 1957 with the collaboration of J. W. Schmidt, P. J. Mattern, and V. A. Johnson. The main thrust of the research has been the development of wheat intervarietal chromosome substitution lines to identify gene-chromosome relationships for economic characters.

Gardner initiated a quantitative genetics research program in maize in 1952 and has provided assistance in quantitative genetic studies on a number of other crops. Emphasis has been on degree of dominance of genes controlling quantitative traits; effects of thermal neutrons, x-rays, and ultraviolet light on genetic variability and its usefulness for improving quantitative traits; development and improvement of breeding systems for population improvement; development of quantitative genetic models, computer simulation and other techniques for obtaining information on quantitative traits; utilization of exotic germplasm; and use of electrophoresis to identify isozyme allels and their relationship to quantitative traits. In 1965, with P. T. Nordquist, he initiated the first random-mating sorghum populations for quantitative genetic studies and sorghum improvement.

Most of Haskins' research at Nebraska has been done in cooperation with Herman J. Gorz, and has dealt with the genetics and biochemistry of coumarin metabolism in sweetclover, the biochemical basis of insect resistance in sweetclover, and more recently various aspects of the cyanide content of sudangrass and forage sorghum plants.

When Frolik became chairman of the Department of Agronomy in 1952, Morris replaced him in teaching the plant cytogenetics course. Haskins, Gardner, and Morris taught different aspects of advanced genetics, which eventually evolved into three 2-credit courses: population genetics taught by Gardner, physiological genetics taught by Haskins, and plant genetics taught by Morris. Subsequently, Gardner added a 2-credit course in biometrical genetics and plant breeding, and later both this course and population genetics were expanded to 3-credit courses. The laboratory portion of advanced genetics also became a separate course, experiments in genetics, with the three scientists taking different segments.

Advances in genetics continue at a rapid pace, and a wide array of techniques in molecular biology and tissue culture are now used in plant genetics.

Soil Fertility and Management

J. C. Russel, soil scientist in agronomy, initiated studies with fertilizers at the "State Farm" in the 1920's that began to establish a base for use (5, 1929, p 16). M. D. Weldon, starting in 1930, and H. F. Rhoades, in 1934 when Russel was on leave, expanded fertilizer research. Except for phosphate on sugar beets, very little commercial fertilizer was used in Nebraska prior to World War II. In 1950 only 44,000 tons were used. In 1980 usage in Nebraska was 2,033,489 tons, an increase of nearly 50 times in 30 years. Fertilizer, especially nitrogen, has become an important annual input on most cereal crops grown in the state as well as on pasture and forage (8).

After the end of World War II munitions generally shifted factories from manufacturing explosives to producing nitrogen fertilizer. Thus, the fertilizer industry began a rapid expansion, resulting in an information base being much needed to assure effective use. Hybrid corn and expansion of irrigation increased the need for fertilizer information.

Rhoades continued his leadership role on soil fertility and management research until his death in 1963. Rhoades' role was passed on to R. A. Olson who led studies in the area until his retirement in 1985. Field investigations carried out on crops grown on Nebraska soils under the Outstate Testing Program during 1950-1968 gave a better perspective of soil fertility needs of the state than existed in any other state in the country at the time.

Nebraska publications (1956) were first to recognize and elaborate the role of the ammonium ion on phosphorus uptake by plants, giving basis for current recognition of monoammonium phosphate as a generally superior form of phosphorus fertilizer. Some of the most extensive field investigations reported in the literature (1964) quantify the impact of fertilizer use on crop water use efficiency, highly relevant to present concerns about fresh water supplies. Much of the understanding that exists on the phosphorus-zinc interaction in crop nutrition attributes to their work in the mid 1960's.

Midwestern farmers are well aware of Nebraska studies of the early 1970's on timing and placement of nitrogen fertilizers in relation to irrigation water management as factors in crop utilization efficiency of the nitrogen and on cereal protein potentials. Recommendations derived from these studies were the primary basis for adjusted farmer management practices in the EPA, USDA and UNL Hall County "nitrate depollution" project.

Olson and colleagues undertook a national leadership role during the 1970's in an effort to bring greater consistency and integrity to soil testing recommendations provided farmers. The study has major implications from the standpoints of energy and resource conservation, economics to the farmer, environmental contamination, and the ultimate preservation of soil testing as a diagnostic tool. Other related work has shown the impact that the practice of irrigation has on chemical and nutrient characteristics of soils, the nutritional importance of the large P reserves in the deep horizons of grassland soils developed on loess (the major soil forming material of arable soils in Nebraska), the fact that surface soil phosphorus levels increase over time with application of no more phosphorus than required by calibrated soil test for most economic yield (invalidating the "maintenance" concept of fertilization), and that the "cation balance" concept is an unnecessary consideration in fertilization of western Corn Belt soils.

Perhaps the group's greatest contributions deal most specifically with the efforts made on the efficient use of fertilizer nitrogen, the environmental impact of nutrient use in agriculture, the upgrading of soil testing as an economic and environmental monitor, and the interaction of tillage method and fertilizer use efficiency. Serious investigations of subsoil contributions to crop nutrition provided evidence of residual mineral nitrogen accumulating from fertilizer in soils, its impact on fertilizer nitrogen needs of crops, and its potential role as groundwater pollutant. Measurements of nitrate in the deep mantlerock of the state brought to light other sources of nitrate pollution of human, animal and ancient origin waiting to be leached to groundwater.

There has also been a strong emphasis on soil fertility and management research at the North Platte Station, conducted by USDA/ARS appointees. The program started with Harry E. Weakly in 1923, followed by Robert Ramig in 1948, and Darryl E. Smika in 1961.

Soil Genesis and Classification

Research in the general area of soil genesis and classification was started in the Department of Agronomy in 1947 with the appointment of Roy P. Matelski. His studies had to do primarily with mineralogy and its methods. Following Matelski's resignation in 1956, James V. Drew was appointed to take over the leadership in this area of work. He gave primary attention to mineralogy and soils genesis. When Drew left the position in the Department of Agronomy in 1970, he was replaced by David T. Lewis. His work has dealt with topics ranging from soil genesis to soil productivity and soil water as they relate to soil survey map units.

Extension and Applied Research

Research has provided the basis and extension for the delivery system of scientific information to farmers for a much improved agriculture during the 100 year period covered by this book. The dramatic increases in yields well documented in earlier sections of this chapter, have resulted in no small degree to the great expansion of irrigation in the state, especially in the case of corn. The private sector in making available the necessary inputs for production, along with research and education, has also played a major role in the increases in yields and production.

Growth of Extension.

The 1915 Cooperative Extension report includes the following paragraph which illustrates the numbers and diversity of agronomic activities at that time (5, 1916, pp xxv-xxvi):

> "Crop Improvement Work - a total of 688 demonstrations were started by County Agents for the purpose of improving farm crops. Of these, 184 were to show the value of treating seed oats for the prevention of smut. Twenty-two demonstrations were started to show the superiority of home grown seed corn compared with imported seed corn. The adaptability of certain forage crops to various parts of the State was shown in 32 demonstrations with feterita, 50 with Sudan grass, and 42 with sweet clover. The value of inoculating alfalfa seed was shown in 46 demonstrations. The value of rolling and harrowing winter wheat was shown in 26 demonstrations. One hundred thirty demonstrations were undertaken with corn, and 10 with pastures. Demonstrations in the seeding of alfalfa were undertaken in 34 instances."

Harvey Kuhlman (left) of Bloomfield; Gilbert W. Erickson, Knox County agricultural extension agent; and Elvin F. Frolik extension agronomist. Picture taken in 1937 when growing sorghum was one of the most effective ways of combating the drought of the 30's.

Particularly significant in the 1916 annual report of the AES is the rather extensive list of extension workers that included W. W. Burr, professor of agronomy (part time) and Porter L. Gaddis as assistant professor of agronomy (Extension). Thus, it appears that Gaddis was the first full time agronomy extension specialist (5, 1916, pp xxxii-xlvi).

In 1917 Gaddis was moved to another position. F. D. Keim and Paul H. Stewart were employed as agronomy extension specialists and T. H. Goodding as a junior extension worker. Stewart continued in this role until 1938 when he left the University. Keim moved to a teaching-research assignment. T. H. Goodding became an instructor in agronomy in 1919.

In 1919 Dominic L. Gross was transferred from his position as assistant agronomist to assistant extension agronomist to team with Stewart in this changing, expanding program.

One of the major extension programs was the pasture contest started in 1935 which was expanded into the pasture-forage-livestock program in 1938 and continued until 1948 (for details see Part II, Chapter 4).

By September 1, 1956, there were nine extension agronomists on the agronomy staff at Lincoln. Probably eight of these nine were on full time extension appointments. Fields of specialization included crops, weeds, range, soils, and soil and water conservation.

Major organizational changes which took place in the College of Agriculture, principally during the sixties, resulted in greater integration between the Station and Extension, including the placing of many staff members on joint appointments in the two Divisions, and also headquartering a rather large number of these positions at the off-campus stations/centers, (see Part II, Chapters 1 and 4). These changes had the effect of spreading a part of the extension specialists over the five districts/centers rather than concentrating all of them in the Department of Agronomy at Lincoln.

On February 1, 1974, the agronomy extension staff consisted of nine men, all but one of whom held joint appointments in the Station.

Following Stewart and Gross, the list of primarily (more than 50 percent appointment) extension agronomists who spent at least 10 years with the Department at Lincoln and who were on the staff prior to 1975 are: forage crops - W. J. Moline; grain crops and NGIA - W. Duane Foote and J. C. "Chet" Swinbank; pastures and NCIA - Elvin F. Frolik; pesticides and weeds - John D. Furrer; range management - Donald F. Burzlaff; soils - Clinton A. Hoover, Donald H. Sander, Marcus C. Weldon, and Richard A. Wiese; soil and water conservation - Harold "Hi" Gilman; soil testing - Delno Knudsen; and weeds - Alexander R. Martin.

Outstate Testing

Early in 1943, F. D. Keim, never one to miss an opportunity to strengthen the Department of Agronomy, worked closely with the Legislature to obtain funds for a crops and soil testing program over the state. The outcome was the passage of LB 284 (49) introduced by D. S. Anderson of Dawson County, E. M. Neubauer of Harlan County, and Robert B. Crosby of Lincoln County. Section 3 of the Act stated that "The object of such experimental stations shall be to study and demonstrate, both without and under irrigation, cropping systems suitable to the area, fertilization practices, methods of water distribution, the production of new crops, crop variety tests and such other matters as may be deemed best to develop the agricultural interests of the state."

According to Section 4, the program was to be ". . . under the supervision and direction of the Department of Agronomy . . ." According to Section 6 "There is hereby appropriated . . . the sum of twenty-five thousand dollars for the biennium ending June 30, 1945 . . . for carrying out the provisions . . . of this Act".

Beginning 1937, G. T. Webster, extension agronomist, helped county extension agents conduct farm demonstrations and field tests. He was designated leader in charge of the Outstate Testing program. J. W. Fitts was primarily responsible under G. T. Webster for the first year's soil studies in "Outstate Testing".

In 1948 the Outstate Testing program was enlarged to include horticulture, plant pathology and entomology. Later agricultural engineering was also added. F. Jamison Bell was employed to administer the enlarged program. Bell resigned December 31, 1949 to go to North Carolina (17, 1948, 1949). The coordinated expanded program never really got underway. August F. (Gus) Dreier employed to work in the Outstate Testing Program in 1948 was made leader of the Agronomy component in 1949. The other departments also continued with their respective programs.

The question of how to publish results so that farmers would get benefits as quickly as possible had to receive attention. The first year's results were published as Experiment Station Bulletin 372 "Variety Tests for 1944" and Bulletin 373 "Soil Studies for 1944". Such publication was too slow and expensive. In 1948 publication was initiated in mimeographed form. Nebraska Outstate Small Grain Variety Tests in 1948 for winter wheat, winter barley, and rye were published as mimeographed *Agronomy Department Circular* 95 in August 1948. *Nebraska Outstate Varietal Tests of Spring Small Grains* for 1948 were published in Circular 1 of the Outstate Testing Program in December 1948.

Outstate Testing circulars were first listed among Experiment Station publications in the 68th Annual Report for 1954 (5, 1955, p 7). The sequence of circulars was dependent on time of harvest and time when farmers could use information in producing the next crop. Emphasis was placed on the fact that results from several tests averaged over a period of years are much more reliable than tests from just one year. The annual circular on corn performance tests was published in largest numbers and was in greatest demand.

Beginning in the mid-sixties, the Outstate Testing Program in agronomy was reduced to crop variety testing, with Dreier becoming primarily a coordinator for the statewide program (25). The term "outstate testing" no longer appears in the titles of research projects in agronomy, the only project of which Dreier is the leader being "Evaluation of grain crop variety performance in Nebraska" (5, 1985-86)[2].

Agronomy Extension Publications

The printed extension circulars as used in early years were expensive and could not be updated rapidly enough to keep abreast of new information. In 1955 John Furrer, extension agronomist, took the lead in developing *Agronomy Tips*, a sheet mimeographed in the department and published weekly or biweekly. It included short, current articles on topics considered timely. As extension agronomist, J. C. Swinbank expedited preparation and distribution of this publication until his retirement in 1965.

Farmer demands for current information kept increasing. In 1973 the Cooperative Extension Service established the NebGuide series of leaflets, usually two to four pages on single topics, to be indexed and used by all departments. The first NebGuide was G73-1 "Fertilizing Soybean Fields", with E. J. Penas and R. A. Wiese as authors. The series has served agronomy needs well.

While *Agronomy Tips* or NebGuides formed the skeletal structure of agronomy extension publications, there have also been many campaign circulars and special reports to meet needs as they arose.

[2]The only project in the Station still including the term "outstate testing" in the title is Plant Pathology Project 21-010 "Plant Pathology outstate testing" under the leadership of M. G. Boosalis.

Stubble Mulch Farming

Severe dust storms of the thirties were an important factor causing the U.S. Congress to establish the Soil Conservation Service (SCS) and other programs to reduce the erosion threat to the nation. SCS located F. L. Duley at Lincoln in 1938 to establish a research project on soil erosion. SCS and the University shared jointly in the salary of J. C. Russel, long time soil scientist on the Nebraska staff, to work with him. The Duley-Russel team received international acclaim for research establishing the principles of subsurface tillage to control weeds while leaving crop residues on the surface as a "stubble mulch" to protect the land from wind and water erosion. Working with implement companies and farmer-inventors, they developed sweep machines and "treaders" to do the job.

The USDA added T. M. McCalla to the team in 1941 to address the problems of crop yields and mulch reduction with sweep tillage (Soil Sci; Soc Am Jrnl - p 507, vol 49, 1985). Based on McCalla's findings, the many faceted aspects of increased biological activity, nitrogen immobilization and phytotoxicities in the soil surface with the surface mulch have assisted materially in the development of improved management practices for the implementation of reduced tillage in crop production in recent years in the U.S. (44, pp 5-10).

F. L. Duley, USDA staff member and professor of agronomy, and Howard DuBois, field technician, examine soil in a corn field for stored moisture in 1957. Duley, J. C. Russel and Thomas M. McCalla pioneered research on the benefits of leaving crop residues on the surface of rolling land, rather than plowing them under.

Soil Testing and Fertilizer Use

In 1946, R. A. Olson set up a soil testing laboratory in the basement of Experiment Station hall. The facility was expanded when Marcus D. Weldon was appointed extension soils specialist in 1948.

Weldon trained two secretaries to run routine tests for phosphate, nitrate, and nitrification rate. This was a timely complement to the greatly expanded fertility research trials of the Outstate Testing program initiated in 1944. With occupancy of the new Agronomy Building in 1952, Soil Testing had offices and a laboratory equipped for its use.

Pressures led to employment of Delno Knudsen in 1953 to develop and manage soil testing, a role he was to play throughout the rest of his University career. He standardized procedures with adjoining states. As commercial soil testing began to test a major part of the many thousands of samples submitted statewide, his laboratory became the legally recognized standard for checking both analytical methods used and the precision of analysis.

As results of many Outstate Testing fertility trials accumulated, each having had soil test samples, the Nebraska Soils Extension group had an excellent base for making fertilizer recommendations from soil test analyses. They could make fertilizer recommendations with confidence that farmers would get an economic response and that excessive use, added cost, and the potential for contaminating underground water would be minimized.

Weed Control Program in Nebraska

One problem that has always confronted crop producers is weed control. Farmers were greatly concerned about the rapid spread of Russian thistle, downy brome, and kochia, all annuals. F. D. Keim and Anton L. Frolik published a 40-page bulletin, No. 288, *Common Grass Weeds in Nebraska* in 1934. The same year T. A. Kiesselbach, N. F. Petersen, and W. W. Burr published Bulletin 287 on *Bindweeds and Their Control* reporting 15 years of investigations. Clean summer fallow or treatment with sodium chlorate were recommended for bindweed eradication, both of which were very expensive (5, 1935, p 12).

Nebraska's first full-time weed scientist was Lewis S. Evans, located at Lincoln by the USDA Cereal Office in 1936. Successively Noel Hanson, University staff member, followed Evans in 1941 and Neal Shafer in 1948. Research on selective herbicides and aerial application had become important by the time Shafer resigned in 1959. Much credit must be given Orvin C. Burnside for the leadership provided in developing Nebraska's weed science program during his tenure from 1959 to 1985 (17).

In 1948 the USDA re-established a full time weed position by locating Dayton L. Klingman at Lincoln for research on weed control in range and pastures. Melvin K. McCarty filled this position in 1953 after

Klingman was transferred to Washington. Through the years, until he retired in 1984, his work complemented that in field crops and provided the base for sound extension recommendations (17).

As pesticide technologies have advanced rapidly and also farmer use, extension specialists have been hard pressed to provide current information so that use is kept safe, effective, economical, and restricted to need established by scouting fields. Furrer met an important need when he took the lead in setting up annual series of "Crop Protection Clinics" at several locations across the state held in January each year. The Departments of Entomology and Plant Pathology help conduct these clinics. High attendance attested to the need for information that the clinics provided for control of weeds, insects, and diseases.

International Programs

UN Technical Assistance Program in Turkey

In 1955 the University contracted with the predecessor of the U.S. Agency for International Development (USAID) to help the government of Turkey establish Ataturk University in eastern Turkey. T. H. Goodding retired from agronomy in order to join the initial Nebraska team for two years at Ankara. The following year, E. C. Conard, pasture management, and R. L. Fox, soil fertility, accepted assignments there. In 1959 M. D. Weldon, soil fertility, joined the team for two years being located at the new Ataturk University site at Erzurum, 1000 kilometers east of Ankara. From 1965-67, Donald G. Hanway, on leave as chairman of the agronomy department, served as Chief Advisor, Nebraska Group in Turkey (17).

Nebraska Mission in Colombia

The second major involvement of the University of Nebraska in a foreign development program was in Colombia beginning in 1966. Agronomy was involved in a major way. W. E. Colwell, agronomist and former director of the Experiment Station at North Carolina, was the first chief of party and director. A. D. Flowerday was director of the extension program in Colombia. Kenneth D. Frank was in soil fertility. Agronomists outside the continuing agronomy staff, who served in Colombia, were F. S. Davis, weed control; Larry Jeffery, weed control; G. D. Jolliff, pasture and range; and C. J. Jorgensen. In 1969 William E. Colwell returned to the East Campus as dean of International Programs; Flowerday returned to his position in agronomy; and Frank returned to a soils position at the South Central Station (18).

International Winter Wheat Evaluation Network

Research emphasis on wheat protein by V. A. Johnson and J. W. Schmidt led to a ten-year grant from USAID to evaluate the world's germplasm stocks for lysine and the potentials for improving the nutritional value of wheat. Paul Mattern greatly expanded facilities in the wheat quality laboratory to run the many thousands of analyses involved. While phenomenal gains in nutritional value were not achieved, some gains were made, the most useful being that varieties with higher genetic potential for protein could be developed (28).

The nutritional value study sparked interest and support of the USDA and USAID in establishing a worldwide network of variety evaluation nurseries where winter wheat is grown. By providing leadership to establishing the nursery network and then arranging international conferences of wheat breeders, V. A. Johnson, through this effort has made the best germplasm available to all wheat breeders and stimulated its use in varietal improvement (28). Many people around the world will benefit from this international effort.

Federal Cooperation

For many years the Department of Agronomy at the University has had a national reputation for cooperating closely with the USDA, with respect to obtaining as many federal staff people to be stationed at Lincoln as possible. The Department provided office space, laboratory facilities and land for field experiments for these federal employees. As chairman of the Department, F. D. Keim strongly supported federal cooperation, and to a considerable extent increased the size of the staff through this means. Keim's successors followed in his footsteps with respect to encouraging federal cooperation.

The USDA staff members were considered members of the departmental staff and were effectively integrated into its activities. They had dual state and federal budgets for operations. The department frequently worked out special opportunities of mutual benefit so that the federal scientists could teach a graduate level course in their respective areas of specialization and supervise the research programs of graduate students (17).

USDA staff who have been stationed in the agronomy department at the College of Agriculture at Lincoln, starting not later than 1974, with staff appointments in the University have been:

Name	Field of specialization	Period covered
Alvin Keyser	Agriculture	1904-1905
Hewitt M. Tysdal	Alfalfa	1928-1943
Coit A. Suneson	Wheat and other small grains	1930-1935
Samuel Garver	Sweet clover production practices	1935-1946
Jess L. Fults	Plant materials - conservation	1935-1939
Elverne C. Conard	Plant materials - conservation	1935-1945
Bruce Lyon	Plant materials - conservation	1935-1936
Karl S. Quisenberry	Wheat breeding	1936-1947
Karl E. Manke	Sweet clover breeding and genetics	1936-1940
Laurence C. Newell	Grass breeding	1936-1975
Lewis S. Evans	Weeds	1936-1943
Orrin J. Webster	Sorghum breeding	1943-1963
Frank L. Duley	Soil and water conservation	1937-1958
J. C. Russel (joint federal/University employee)	Soil and water conservation	1938-1953
Robert L. Cushing	Sorghum breeding	1939-1943
Roland Carpenter	Plant materials - conservation	1940-1941
John M. Slatensek	Sweet clover (some on soybeans)	1940-1947
Thomas M. McCalla	Soil and water conservation	1941-1979
Bliss Crandall	Alfalfa	1943-1947
Hugo Graumann	Alfalfa	1947-1953
Louis P. Reitz	Wheat breeding	1947-1954
Dayton L. Klingman	Weed control in range and pastures	1948-1952
Gilbert T. Webster	Sweet clover	1948-1954
Melvin K. McCarty	Weed control in range and pastures	1953-1984
William R. Kehr	Alfalfa	1953-1983
Virgil A. Johnson	Wheat breeding	1954-1986
Herman J. Gorz	Sweet clover and other forages	1954-present
Harry E. Weakly	Soil and water conservation	1957-1963
Jerry D. Eastin	Sorghum physiology	1965-1970
James R. Ellis	Soil and water conservation	1967-present
Lloyd N. Mielke	Soil and water conservation	1967-present
William M. Ross	Sorghum breeding	1969-1985
Charles Y. Sullivan	Sorghum physiology	1972-present

Cooperation with State Governmental Organizations

In 1955 the Nebraska Wheat Growers Association successfully supported a bill in the Legislature to establish a Nebraska Wheat Commission to be funded by farmers with a fraction of a cent per bushel tax "checked off" at the time of first sale. The objectives of the Commission were to promote foreign and domestic markets for wheat and to help support research and extension activities important to wheat growers.

The wheat breeding program of V. A. Johnson and J. W. Schmidt benefited from a continuing grant from the Commission for many years. In 1959 a Wheat Commission grant made possible equipping the wheat quality laboratory conducted by Paul Mattern. Although modified through the years (the name of the Commission changed to the Nebraska Wheat Board) the checkoff tax on wheat provided support of great significance to the productivity of Nebraska's wheat breeding program (35).

In 1959 the Nebraska Legislature established a levy to support a program of research on agricultural products administered by the Nebraska Department of Agriculture. Lonnquist obtained a grant from this fund to develop high amylose corn hybrids for Nebraska. Amylose has a potential for plastics and other commercial uses. Marvin Lindsey (1960-64) assisted with breeding activities and Alfred Haunold with analyses. Considerable progress was made, but the program ended in 1965 with termination of the grant (26, 1963-1:17, 18).

Support from the Rockefeller Foundation (47)

Projects supported by the Rockefeller foundation have been:

Sorghum: "The Physiology of Yield and Management of Sorghum in Relation to Genetic Improvement" - Jerry D. Eastin, Max D. Clegg, Jerry

Maranville, C. Y. Sullivan, William M. Ross, M. G. Boosalis, Robert V. Klucas, and R. C. Lommasson. All funding came to Agronomy Department, April 1966 through August 1976.

Corn: "The Effect of Linkage on Estimates of Degree of Dominance of Genes Determining Quantitative Characters in Corn" - John H. Lonnquist and C. O. Gardner, 1958 through 1967.

Special Subunit — Foundation Seed Division

For full benefits to be realized from developing improved varieties, the small amount of breeder seed must be increased quickly and distributed to seed growers so that it becomes generally available for farmer use. Secondly, a source of "foundation seed" that retains the bred-in characteristics must be maintained as a continuing source for seed producers. In the Agronomy Department, the Foundation Seed Division provides that necessary link between breeding programs, certified seed producers and others, and farmers across the state (40).

As farmers were rapidly changing from production of open-pollinated varieties to corn hybrids, in about 1940 the Nebraska Crop Improvement Association, through certified growers, began multiplying corn inbreds and producing single cross seed stocks. By 1946 the NCIA Board of Directors became convinced that they should not be both increasing seed and certifying their own seed increases. As a result, the hybrid seed corn growers formed a non-stock cooperative, the Nebraska Certified Hybrid Seed Corn Producers Association, with Warren W. Sahs as manager, to produce and sell seed stocks to seed producers. By 1949 their limited sales convinced the seed corn growers that their program should include seed increases of all crops, not just corn (39).

In 1949, F. D. Keim, chairman of the Agronomy Department, received University approval for establishing the Foundation Seed Division in the Department of Agronomy with Sahs as manager. Keim obtained use of the two Genoa Board of Control farms for the Foundation Seed Division. This was a start but access to adequate and suitable land for seed stocks production continued to be a serious problem.

In 1952 by assuming responsibility for the Soil Conservation Service grass nursery materials at the Two Rivers nursery tract at Waterloo, Nebraska, and at the Nebraska Ordnance Plant, Foundation Seed obtained use of additional land, some marginal and inconvenient to operate. Sahs managed well under difficult conditions (39).

In 1955 the Agricultural Research Foundation of Omaha, with J. LeRoy Welsh, President, gave its former chemurgic plant at 3115 North 70th Street, Lincoln, to the University for a Foundation Seed Division headquarters. Processing and seed storage facilities were added and this is now the primary center of operations and seed distribution.

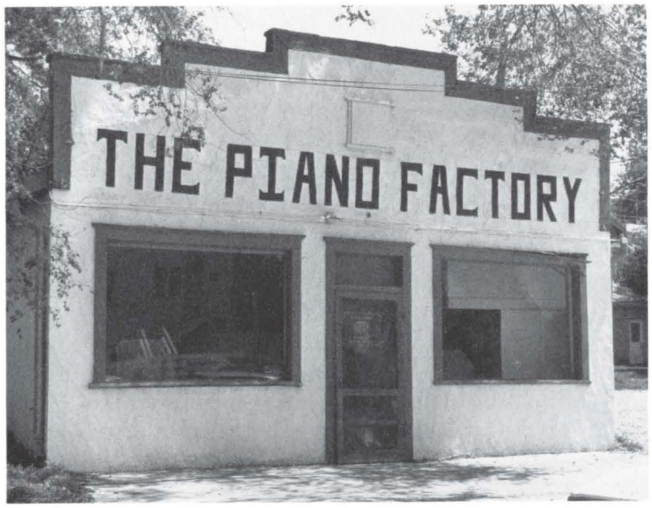
The allocation of approximately 1,000 acres of desirable land, along with operating and warehouse facilities in a load line, at the Field Laboratory at Mead, placed the Foundation Division in a strong position to carry out its role. The Two Rivers farm was turned back to the federal government. The South Farm at Genoa which was adjacent to town and presented many operational problems was sold in 1962 and 1966 (39).

Being fully self-supporting except for the land and buildings provided, Foundation Seed developed irrigation at the North Genoa farm and on much of the Field Laboratory land. In 1970-1972 it installed a modern seed processing plant at the UN Field Laboratory at Mead, making the total facilities of the Seed Division one of the best in the nation.

With the Foundation Seed Division functioning as a part of the Agronomy Department, breeders maintain close liaison during seed increases of new varieties, observing and assisting with any roguing that is necessary. Over 150 different varieties and lines of 14 crops are maintained. Though certified seed producers are primary customers, any seed producer or company may purchase foundation seed (40). When desirable or necessary, the manager of the Foundation Seed Division can arrange to have seed produced at Nebraska Research and Extension Centers or even in other states, such as alfalfa seed in Idaho (40).

The Foundation Seed Division makes substantial grants annually to support plant breeding research in the Department of Agronomy.

Warren W. Sahs deserves much credit for the leadership he gave from 1949 to 1961 in developing the Foundation Seed Division. In 1957 LaMoine Brownlee was hired as assistant manager. When Sahs resigned in 1961, Brownlee became manager. In 1967 Brownlee was succeeded by Richard Mills (17, 18).



In the early 40's, the Nebraska Crop Improvement Association used this building for processing foundation seed which was sold to growers of certified seed. In the 30's the building housed Winne's Cafe. It was on 35th Street east of where Valentino's Ristorante now stands.

These three staff members deserve credit for the fine reputation that the University of Nebraska Foundation Seed Division enjoys among Nebraska farmers and the seed industry generally.

Related Organizations

Nebraska Crop Improvement Association

In 1902 T. L. Lyon, agriculturist, assembled a group of farm leaders to consider forming an organization to improve and increase the corn crop in Nebraska. The Nebraska Corn Improvers' Association was formed with T. L. Lyon as its secretary from 1902 to 1906. Working closely with the College of Agriculture, the Association sponsored many educational activities including corn shows, corn trains, and corn and wheat yield contests (16, pp 1-7). College staff serving as secretaries were T. L. Lyon (1902-1906), E. G. Montgomery (1906-1911), T. A. Kiesselbach (1911-1918), and W. W. Burr (1918-1920) (16, p 85).

After expanding its interests and activities to include grains, legumes, and other farm crops, in 1920 the Nebraska Corn Improvers' Association changed its name to the Nebraska Crop Growers Association. Staff, primarily extension agronomists, served as secretaries. In 1921 the Association agreed to handle field crops seed certification work and established fees for inspection and certification. Field inspections were made by members of the Agronomy Department (16, pp 10, 85).

The Nebraska Crop Growers Association was designated as the official agency for certification of agronomic crop seed or plant parts to be used for propagation by W. W. Burr, dean of the College of Agriculture, under the authority of HR 67 passed by the Nebraska Legislature in 1931. HR 67 specified that certification shall be on a self-supporting basis and that the College was responsible for determining the manner and form of the certification program. The Association, under a Board of Directors, already in 1931 had a long history of close working relationships with the Department of Agronomy (16, p 23).

Elvin F. Frolik served as secretary during the period 1940-47. During this period emphasis was placed on seed certification as a business rather than merely an honor and service as it had largely been before. The shift was accomplished by modifying the constitution on February 4, 1942 to change the name to the Nebraska Crop Improvement Association, electing a Board composed of certified seed growers and limiting the terms of office, initiating publication of the *Nebraska Certified Seed News* and by naming a premier seed producer at the reinstated annual banquet. A seed testing laboratory was developed to avoid the delays necessitated in submitting the samples to the State Seed Laboratory. Management shifted from a secretary paid with University funds to first a manager and then a secretary-manager (Paige L. Hall), paid from fees collected for seed certification services. Inspectors were hired to do the field work instead of depending on agronomy staff members.

In 1951, secretary-manager Clare Porter started the "drill box survey" as a method of checking seed that farmers were planting. The Nebraska Grain Improvement Association had been conducting a related program beginning in 1938 under the title of "100 farmers' wheat tests", and later "farmers' wheat tests". The two programs had in common the obtaining samples from large numbers of farmers, planting the samples in tests and checking for varietal identification, mixtures, weed seeds, germination, and other factors of quality. The chief difference between the two programs consisted of the way the farmer samples were obtained. Except for the very early years when samples for the NGIA tests were obtained from elevators, the NGIA representatives obtained their samples principally from the county agents (who probably had farmers bring them to the county offices) whereas the NGIA representatives obtained farmer samples by driving over the countryside and as they saw farmers planting, they would stop and take samples from the drill boxes.

In both programs, field meetings were held as the crop in the test plantings neared maturity to show the farmers the crop resulting from each sample planted. These tests were continued by both organizations for many years. They were popular with farmers, and were a major factor in improving the yield and quality of Nebraska grains.

Starting in 1958 with Dean Lancaster as secretary-manager, seed certification was changed from being limited to varieties and hybrids produced by universities and the USDA, to varieties and hybrids under the control of the private seed trade. This was accomplished by the following important steps: 1) in 1959 a seed trade representative was added to the Board of Directors (Hollis Miller of York being the first appointee); 2) in 1962 field inspection service was extended to proprietary varieties and hybrids, 3) certification was expanded to include privately developed crop varieties and hybrids; and 4) in 1973 largely through Lancaster's efforts, the Nebraska Seed Law was amended to bring the standards for certified seed in line with the Federal Seed Act (Nebraska and North Carolina being the first two states to take such action). This was the beginning of a movement to unify legally certified seed standards across the country. Now for the first time certified seed could move as such freely in inter-state commerce (48).

Nebraska Grain Improvement Association

In the thirties, commercial grain companies, primarily in Omaha, began actively to support and promote the idea of improving the quality of Nebraska's grain. On July 1, 1938, in close cooperation with the Department of Agronomy, they established the Nebraska Grain Improvement Association (NGIA) in

Omaha with Fred E. Siefer, as the first secretary. Contributions were received from 7 railroads, 8 mills, 2 insurance companies, 2 implement dealers, and 12 miscellaneous sources. Siefer collected farmer samples of wheat principally through elevators for planting in 21 counties with a master plot at Lincoln as a means of surveying the varieties being planted, mixtures of rye and other varieties present, amount of smut, and other quality factors. Agronomists found little bunt, showing that the seed treatment program through the previous decade had been effective, but eight percent of the samples had rye mixtures (38).

In August 1939 Glenn LeDioyt replaced Siefer as secretary, with the office being moved to the agronomy department. The efforts expanded and contributions increased. LeDioyt resigned in April 1943 and was replaced by J. C. Swinbank who for over eight years had been county extension agent in Cheyenne County. Arrangements were made for the Cooperative Extension Service to pay part of Swinbank's salary, and Agronomy continued to provide office space. The program was truly a joint, cooperative effort of Agronomy extension and the grain trade.

On June 1, 1952, Leslie F. Sheffield was hired as NGIA field secretary. Programs were developed with 4-H and FFA. In 1966 increased attention was given to grain storage and sanitation. Publicity in grain trade magazines was also increased. NGIA members listed that year included 97 grain elevators, 25 banks, 22 growers, and 3 others. The list of commercial contributors had also expanded (43).

From 1956 to 1958 Donald J. Lehr served as NGIA secretary and was followed by W. Duane Foote to 1985, at which time the NGIA became inactive.

The emphasis given grain quality by the joint, cooperative programs of the Nebraska Grain Improvement Association and the Cooperative Extension Service helped make Nebraska grain a desired product in the grain trade.

History of Agronomy Judging Teams (14)

The first Nebraska grain judging team placed sixth in the international hay and grain judging contest in Chicago in 1926. Beginning in 1930, with Anton L. Frolik as coach, the Nebraska team placed first 4 times and second 6 times in the national contests held at Kansas City. In contests held at Chicago in the same period, Frolik-coached teams placed first 4 times, second twice, and third twice. The teams coached by Frolik over a 10-year period set a truly outstanding record.

Nebraska teams continued to compete in the national grain and hay judging contests and placed well. Coaches of teams through the years were: T. H. Goodding (1926-29), Anton L. Frolik (1930-39), Glenn C. Klingman (1940-46), David A. Sander (1947-50), R. Chase Allred (1951-54), and John A. Goodding (1955-59). The grain judging teams were terminated after 1959 and reactivated in 1986 with Richard L. DeLoughery as coach.

In 1961 a Nebraska team competed in the first soil judging contest held in Region 5, one of seven soil judging regions in the United States. James V. Drew coached Nebraska teams through the first six contests. Since 1967, David T. Lewis has been coach. From 1967 to 1974 the team placed either first or second in the regional contests and won the right to compete in national contests (14).

Individual Recognition

Staff

Recipients of Honorary Doctorate Degrees:

John W. Schmidt, Kansas State University	1984

Presidents of national professional organizations:

1) American Society of Agronomy

W. W. Burr	1931
F. D. Keim	1943
Herbert H. Kramer	1966
Charles O. Gardner	1982

2) Crop Science Society of America

Charles O. Gardner	1975
Virgil A. Johnson	1978

3) Soil Science Society of America

F. L. Duley	1946
Robert G. Gast	1982

4) International Crop Improvement Association

Paul H. Stewart	1929
Elvin F. Frolik	1945-46
Clare R. Porter	1953-54

Appointments to UNL Regents Professorships

John H. Lonnquist	1960
Francis A. Haskins	1967
Charles O. Gardner	1970
John W. Schmidt	1981

Recipients of the UNL Distinguished Teaching Award

Thomas H. Goodding	1955
David P. McGill	1960
William Colville	1966
Gary A. Peterson	1973
Lowell E. Moser	1974
Albert D. Flowerday	1976
Robert C. Sorensen	1978
Robert A. Olson	1980
Richard P. Waldren	1983

Teachers chosen by former students as having the greatest impact on their lives, in response to a request which appeared in the Winter 1983 issue of the *College of Agriculture Alumni News*

Anton L. Frolik Robert A. Olson

Thomas H. Goodding
Franklin D. Keim
Gary A. Peterson

UN Outstanding Research and Creative Activity Award

John W. Schmidt	1979
Charles O. Gardner	1981

UNL Distinguished Educational Service Award

John D. Furrer	1986

International Distinguished Service to Agriculture Award by the Honor Society of Agriculture-Gamma Sigma Delta

Virgil A. Johnson and John W. Schmidt, jointly	1969
Charles O. Gardner	1977

USDA Distinguished Service Award

Virgil A. Johnson	1981

USDA Superior Service Award

Frank L. Duley	1955
J. Russell Garl	1958
John W. Schmidt	1986

President or Chancellor of a major university

Martin A. Massengale, Chancellor of UNL	1981-present

Alumni

Honorary Doctorate degree recipients Awarded by the University of Nebraska:

George W. Beadle	1949
Leslie L. Zook	1955
George F. Sprague	1958
Glenn W. Burton	1962
Albert H. Moseman	1965
Harold F. "Cotton" Robinson	1966
Adrian Morris Srb	1969
Orville A. Vogel	1970
William H. "Hub" Allaway	1971
Henry M. Beachell	1972
Marion L. Jackson	1974
Daniel E. Atkinson	1975
Milo L. Cox	1976
B. Rodney Bertramson	1978
Fred L. Patterson	1979
Roy Emil Blaser	1980
Maurice L. Peterson	1981
William E. Larson	1982
Paul H. Harvey	1983
Dale E. Wolf	1986
Eugene J. Kamprath	1987

Awarded by Universities or Colleges Other Than Nebraska

George W. Beadle - total of 35 honorary doctorate degrees from U.S. and foreign Colleges and Universities.

Glenn W. Burton - Rutgers University	1955
Robert L. Cushing - University of Hawaii	1962

Nobel Prize in Physiology and Medicine

George W. Beadle	1944

Japan Prize of the Science and Technology Foundation of Japan, with cash award of $165,000 U.S. dollars

Henry M. Beachell	1987

Elected to Membership in the National Academy of Sciences, Washington, D. C.

George W. Beadle	1944
George F. Sprague	1968
Adrian M. Srb	1968
Glenn W. Burton	1975
Marion L. Jackson	1986

International Distinguished Service to Agriculture Award by the Honor Society of Agriculture-Gamma Sigma Delta

Paul H. Harvey	1956
Glenn W. Burton	1972

USDA Distinguished Service Award

George F. Sprague	1968
William H. "Hub" Allaway	1976
Glenn W. Burton	1980

USDA Superior Service Award

Glenn W. Burton	1955
George F. Sprague	1959
Orville A. Vogel	1962
William E. Larson	1975

President of the American Society of Agronomy

George F. Sprague	1960
B. Rodney Bertramson	1961
Glenn W. Burton	1962
Howard B. Sprague	1964
Roy E. Blaser	1970
Fred L. Patterson	1976
William E. Larson	1985

President of the Crop Science Society of America

Gerald O. Mott	1956
Howard B. Sprague	1960
Paul H. Harvey	1965
Fred L. Patterson	1968
Wayne F. Keim	1984

President of the Soil Science Society of America

J. Walter Fitts	1959
Marion L. Jackson	1967
William E. Larson	1979

Served in Nebraska State Legislature

Ross H. Rasmussen	1961-1967

Member of the Board of Regents of a Major University

Robert L. Cushing, University of Hawaii	1967-1974

Head of a Major University

George W. Beadle, President, University of Chicago	1961-1968
Harold F. "Cotton" Robinson, Chancellor, Western Carolina University	1974-1984

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Chapter 7. Animal Science[1]

Contents

Names of Department

Department of Animal Husbandry	1898-1964	Department of Animal Science	1964-present

Administrators

Name	Title	Years Served
C. H. Elmendorf	Head	1898-1899
Edgar A. Burnett	Head	1899-1906
Howard R. Smith	Head	1906-1911
Ralph K. Bliss	Head	1912-1914
Edgar A. Burnett	Head	1914-1917
(served concurrently as dean of College and head of Department)		
Howard J. Gramlich	Head	1917-1919
Howard J. Gramlich	Chairman	1919-1938
William J. Loeffel	Acting Chairman	1938-1940
William J. Loeffel	Chairman	1940-1959
Robert M. Koch	Chairman	1959-1966
Frank H. Baker	Chairman	1966-1975
Irvin T. Omtvedt	Chairman	1975-1977
Irvin T. Omtvedt	Head	1977-1982
Elton D. Aberle	Head	1983-present

Location of Headquarters

Mechanic Arts Building	1898-1899
Experiment Station Hall	1899-1905
Agricultural Hall	1905-1917
Livestock Judging Pavilion (named Animal Husbandry Hall in 1932)	1917-1968
Marvel L. Baker Hall	1968-present

Space and Facilities Came Slowly

Baker and Crandall (2, p 8) stated "In 1898, the department was staffed on a gratuitous basis by one man (Prof. C. H. Elmendorf), who naturally served as chairman (actually 'head') . . ." (2, p 8). His office was in the Mechanic Arts Building on the City Campus (1, p 6).

When Experiment Station Hall was completed in 1899, animal husbandry—with E. A. Burnett as head[2]—found space in this new building for its headquar-

[1]Dwight Stephens and Cecil T. Blunn provided continuing assistance to the authors during preparation of this chapter. Vicky Kobes also gave assistance.

[2]Burnett was dean of the Industrial College during its last year of existence (1908-1909) and then dean of the College of Agriculture until 1928.

ters. However, Burnett reported that the Department was "practically without equipment except for open and closed sheds for the feeding of 25 head of cattle, and an old piggery equipped for feeding experimental sheep" (2, p 8).

When Agricultural Hall was completed in 1905, two rooms in the south end of the basement were set aside for the Animal Husbandry Department (1, p 10).

According to William J. Loeffel, "no adequate provision for livestock judging was available before 1908, despite frequent requests made by farmers, breeders and students" (3, p 136). In that year, the Livestock Judging Pavilion was completed, although the Animal Husbandry Department continued to be housed in the basement of Agricultural Hall until 1917.

The Judging Pavilion Fire

In the earlier years, the Agronomy Department used much of the second floor of the Judging Pavilion, and all of the third floor which was used as a seed laboratory. The first floor judging arena was divided in two by a steel curtain.

"On a spring evening (May 15) 1931," Loeffel relates, "the Judging Pavilion caught fire. The first floor was gutted and the flames roared up the elevator shaft, burning off the third floor . . . The second floor then used by Animal Husbandry was water-soaked and scorched. The building was stripped down to its shell and reconstructed on a fireproof basis. A new seed laboratory was built for the Agronomy Department and the Judging Pavilion was renamed Animal Husbandry Hall"[3] (3, p 137). (See also "A Disagreement about Buildings" in Part III, Chapter 2.)

Land Needs and New Buildings

Dean Burnett pointed out in the Experiment Station Annual Report for 1920 the pressing need for additional land for livestock and pasture experiments. He explained that there had been a steady encroachment on animal husbandry land for other activities. Burnett reported there were only 100 acres of land available for 100 head of beef cattle, 100 head of dairy cattle, 200 head of sheep and 100 head of hogs. In addition, about 400 head of cattle, hogs and sheep were being fed experimentally (15, p 11).

In 1953, the Department gained a new laboratory for its meats research and teaching. An article in the *Lincoln Star* said the $331,106 Meat Laboratory marked a long step forward in the University of Nebraska's program of service to the livestock industry (7).

"Up until the completion of the building," the article continued, "Professor William J. Loeffel . . . had used an old blacksmith shop as a makeshift meat laboratory,"[4] even though one of the conditions imposed by Loeffel in 1919, contingent to his accepting a position on the animal husbandry staff, was that a meat laboratory be provided (1, p 11).

One of the speakers at the dedication of the new laboratory—Nebraska's lieutenant governor Charles J. Warner—said that "In 1919, Dean E. A. Burnett of the College of Agriculture told Professor Loeffel not to repair the old blacksmith shop as he would be provided with a new building" (7) within 18 months. Thirty-four years later the building materialized.

The new three-story brick and reinforced concrete building was described by the *Nebraska Farmer* as "One of the finest meat laboratories in the country" (8).

In 1967, the University Regents named the building William J. Loeffel Meat Laboratory (9, p 214). The *Omaha Daily Journal-Stockman* described Loeffel as a "modest man" who was a "nationally recognized livestock and meat authority" (10).

In 1968 the Department of Animal Science (its name since 1964), moved into a new building near the north edge of East Campus. It was dedicated as Marvel L. Baker Hall on March 7, 1969. Baker was a University of Nebraska faculty member from 1924 to 1928 and from 1930 to 1963[5].

[3]Named Miller Hall in 1972 for Mr. and Mrs. Leon Miller who farmed west of Cambridge in Red Willow County, Nebraska. Leon Miller died in December 1938, and Mrs. Miller (Ella) in September 1966. "The Miller farm was described as one of the best in the country, a tribute to the value of agricultural research and knowledge and to the superior managerial ability of these two Nebraska pioneers . . ." (5).

[4]A reference to the fact that the old meat laboratory—later the Chemurgy Building—had originally been Machinery Hall which contained a blacksmith shop and where engineering shop courses were taught.

[5]Marvel Baker worked as cashier at the Security State Bank in Curtis, Nebraska from 1928 to 1930 when he returned to the University as animal husbandman at the North Platte Station (6, pp 241-144).

William J. Loeffel was promised a new meat laboratory when he came to the College of Agriculture in 1919. Thirty-four years later the building materialized. It now carries Loeffel's name.

The Department acquired a major facility in 1923 when a beef barn was built at a cost of $24,720 to house the University's breeding herd, show cattle, experimental feeding steers and livestock for classroom instruction. Plans in 1984 called for razing the barn to make room for a new $19 million Animal Science Complex. Because many students earned school expenses while working and living in the barn, plans to remove the 61 year-old structure made it a favorite subject for alumni reminiscing. (See Beef Barn in Part III, Chapter 2) (11).

In 1948, construction of a Swine Research Center just east of Lincoln on Adams Street drew criticism from some Nebraskans—probably because of unfortunate nomenclature. When the Center was proposed, the University called it a "hog barn," which in the opinion of some people did not merit a $138,763 state building expenditure.

Frank H. Baker[6] said "The proposition went to the Legislature for 'X' number of dollars for a hog barn and all hell broke loose. Then it was decided the name of the building was wrong. So it was called—instead of hog barn—a Swine Research Laboratory and . . . boom, it went through like that" (12).

Even after the name was changed to Swine Research Center and construction was completed, the facility suffered from an image problem. It was then referred to facetiously—by a few people—as a Pig Palace and Swine Skyscraper (13).

To the livestock industry, the facility was a significant step forward for research. In an article for the July 1948 *Nebraska Alumnus*, George Round wrote that "There's no doubt but what it (the Swine Research Center) is one of the best, if not the best building of its kind in America today."

Specifically, the Center provided needed research facilities for L. E. Hanson, an associate professor of animal husbandry at the time, whom Round described as "one of the top swine research authorities in the United States" [7].

Hanson used the facilities for about two years and then moved to the University of Minnesota in 1950.

Farms Used by Animal Science

Havelock Farms.

In 1918, the Legislature had appropriated $32,000 to buy 160 acres of land for agronomic research southeast of Havelock and northeast of Bethany. Additional tracts of land were added to the original 160 acres over a period of years so that by the early forties the total amount of land owned by the University was approximately 1,200 acres. The land was known as the Havelock Farms and was used jointly by the departments of Agronomy, Agricultural Engineering, Animal Science, and Dairy Science. A major portion of the land was sold following acquisition of the UN Field Laboratory at Mead (see Part VI, Chapter 1).

Burlington Farm.

"The droughts of the 30's", Loeffel wrote, "demonstrated the desirability of not carrying all one's eggs in the same basket." Frequently a timely rain would produce a good feed crop in one area "while a few miles away, crops would be a total loss." In 1938 the University rented a 480-acre tract of grassland from the Burlington Railroad near Pioneer Park, southwest of Lincoln. This area was used for beef cattle research until 1960, when the University relinquished the tract (1, p 12).

The Rogers Memorial Farm.

(See Part VI, Chapter 10.)

The Dalbey-Halleck Farm.

(See Part VI, Chapter 10.)

Teaching (28)

Early Courses and Professors

Livestock courses have been taught at the University since at least 1896, two years before the Animal Husbandry Department was formally established. The University Calendar for 1896-1897 listed two courses—stock feeding and breeds and breeding of livestock.

The first animal husbandry professor to be listed was Edgar A. Burnett (calendar for 1899-1900). The 1902-1903 calendar showed Burnett as associate dean of the Industrial College and professor of animal husbandry, and Howard Remus Smith as a professor in the Department.

A map in the 1920-21 Annual Catalog of the College showed three buildings on the University Farm Campus designated Judging Pavilion, Machinery Hall and Horse Barn. Facilities for instruction were described as follows: "The Judging Pavilion furnishes large and commodious stock judging laboratories and in addition houses the Animal Husbandry Department" (a staff of five). In later years the judging classes were moved to the Horse Barn and in 1968 the staff to the new Marvel L. Baker Hall.

The same catalog also stated that a new Agricultural Engineering Building had just been completed (now named L. W. Chase Hall). With the moving of Agricultural Engineering, the north end of Machinery Hall was converted to an abattoir providing facilities for meats classes. This facility was used until the completion of Loeffel Meat Laboratory in 1953.

[6]Frank Baker was chairman of the Department of Animal Science from 1966 to 1975.

[7]R. G. Gustavson, Chancellor of the University when the Swine Research Center was built, said when he came to Nebraska that "he was not interested in trifling research," according to Round. "He wanted work done on the big problems of Nebraska and the country — and he wanted research done by capable personnel with good equipment. Otherwise, he said, the results didn't amount to too much." Hanson, the researcher; the new building; and the problems to be researched apparently all fit Gustavson's criteria.

Emphasis Changes to Science

The Department of Animal Science was originally named Animal Husbandry because of the strong emphasis on livestock production in the courses offered. In 1964 the name was changed to Animal Science because of the change of emphasis to the sciences in course curriculum. Originally, poultry courses were taught in the poultry section of Animal Husbandry. This section became the separate Department of Poultry Husbandry in 1922 and a major was established in 1923. In 1977 the Poultry Science Department again became a part of Animal Science. In 1967 the Dairy Science Department staff and courses taught in the dairy production area were incorporated in the Animal Science Department.

For a number of years undergraduates could major in animal husbandry but beginning in 1935, College of Agriculture majors were no longer specified. Rather they were listed under Comparative Group Requirements, even though the departmental courses remained as previously listed, so for about 20 years no animal science majors per se were graduated. In 1956 a major in animal husbandry was re-established.

In 1974 the Department was offering a total of 47 courses with a teaching staff of 22.

First Graduate Degree Awarded in 1927

The first master's degree in animal science was awarded in 1927, and a PhD program in the area of animal genetics was approved in 1951. In 1953 Ralph Boulware earned the first doctorate in the new program. Boulware was later a professor of animal science at Louisiana State University, where he retired in 1979. The second PhD (also animal genetics) was awarded to Vernon Garwood in 1956. In 1961, a PhD program in animal science was initiated.

Between 1926 and 1984, 432 graduate degrees were awarded in animal science, 326 master's degrees and 106 doctorates. Of the total, 237 were in nutrition—78 monogastric nutrition and 159 ruminant nutrition. Other subject matter areas were animal breeding and genetics, 75; meats and poultry, 53; and physiology, 67.

Judging Teams

Livestock judging. Loeffel called the International Livestock Exposition at Chicago the "court of last appeal" so far as judging contests go. The first Chicago contest was held in 1900, but the University of Nebraska did not enter until 1908. Eight teams competed that year and Nebraska placed second. Howard J. Gramlich placed third individually and a teammate, J. F. Coupe, placed fourth.

The University won the Chicago contests in 1917 and in 1924. Five Nebraskans have won the "high man" award at Chicago: W. F. Roberts in 1917, W. E. Wiederburg in 1919, Dorsey Barnes in 1924, Russell Schelkopf in 1951, and John Jarchow in 1969.

Marvel L. Baker, animal science professor (left), and Charles Johnson, herdsman, with NU Gold Nugget, grand champion shorthorn at the National Western Stock Show at Denver in 1941. Animals of this quality were valuable in training student judging teams.

Later, other livestock judging contests were established in the Midwest, usually in conjunction with a major livestock show. There was a contest at Kansas City in conjunction with the American Royal. The National Western Stock Show at Denver; the National Swine Show, which moved about from place to place; the Southwestern Fat Stock Show at Fort Worth, Texas; the National Belgian Show at Waterloo, Iowa; and the National Barrow Show at Austin, Minnesota, were the chief contests in this area (1, p 41).

Over the years, University of Nebraska judging teams competed in all of them.

Wool judging. Some years ago the Midwest Wool Marketing Cooperative at Kansas City instituted a wool judging contest to give agricultural college students a better appreciation of wool classes and grades, and methods of marketing. Nebraska students have won this contest a number of times (1, p 43).

Meat judging. The National Live Stock and Meat Board, organized in 1923 to do promotional and educational work for meat, included representatives from all branches of the livestock and meat industry. When the Board approved a "Quality in Meat" project in 1924, a natural outgrowth was an interest in grades and grading. Loeffel thought the best way to standardize meat grades was through a meat judging contest. His idea received enthusiastic support from industry and educational leaders.

The first meat judging contest was held at the International in Chicago in 1926. The University of Nebraska won the contest in 1926, 1928, 1935, 1937,

1938, and 1940. In eight contests, high individual award was won by Nebraska students. In 1926, Don Ray was high individual; in 1928, two Nebraska girls (Louise Genung and Marjorie Thompson) tied; in 1930, Eva Buel; in 1935, Vincent Arthaud; in 1937, Carl Swanson; in 1938, Ed Zahm; in 1940, Don Baird; and in 1941, Vern Kerchberger.

While the contest was originally designed for men, the University of Nebraska was represented on at least three occasions by teams composed of home economics students (1, pp 43-44).

Departmental Student Clubs

In 1917, the student publication *Agriculture* reported that "a few advanced animal husbandry students met at the home of Elliott Davis and formed the 'Saddle and Sirloin Club'. They chose as their motto 'The Advancement of the Livestock Industry.' Officers selected for the current semester were: president - M. B. Posson; vice president - Charles Kellogg; secretary - Elliott Davis; treasurer - T. Wilson" (16).

There were 16 charter members. Honorary members were Dean Burnett, Howard J. Gramlich, H. B. Pier, K. F. Warner, and E. L. Jenkins.

At the International Livestock Show of 1919, representatives of the animal husbandry department clubs of Nebraska, Iowa, Kansas and Missouri met to form a permanent national organization. The name of the Missouri organization, the "Block and Bridle Club," was adopted. Since then, many additional chapters have been organized.

The first Nebraska Baby International was held in the Judging Pavilion by the Saddle and Sirloin Club, November 21, 1917, as a benefit to the Red Cross. This was a fitting contest in which students groomed and prepared animals for show.

When the Knights of Ak-Sar-Ben started their livestock shows in Omaha, the name of the fitting contest was changed to "Junior Ak-Sar-Ben" as a courtesy to the Nebraska show. Later the name of the show was changed again to the "Block and Bridle Show" (1, p 45).

Research

Research work of the Department can be roughly divided into two broad time phases—basically the pre-WW II and post-WW II periods. The early period was characterized by extensive use of purebred sires, livestock shows and big hitches with horses.

Local stocks were being "graded up" toward the level of pure breeds. Nutritional research was largely done in the form of feeding trials. In the early days the knowledge of biochemistry and nutrition was rudimentary as compared with today's knowledge. Trials comparing the value of various feed stuffs and combinations of feeds for growth, reproduction and finishing of animals were conducted.

Swine Nutrition (18)

Swine nutrition in the early period (up to about 1950) was devoted largely to feeding trials developing the triad of corn, soybean oil meal and alfalfa. It was found that combinations of these three ingredients gave a better amino acid balance than when they were used singly. It was also necessary to include a source of animal protein such as fish meal, meat and bone scraps, and blood meal if maximum growth and development were to be obtained.

The separation and purification of vitamin B_{12} in 1948 opened a new phase of swine nutrition. With the advent of vitamin B_{12} it became possible to use an all plant ration and obtain adequate growth and reproduction.

Associated with the discovery of vitamin B_{12} was the isolation and characterization of antibiotics—found as by-products of industrial fermentation processes. The introduction of antibiotics into swine nutrition brought about an increase in rapidity of gain together with an increase in feed efficiency. The use of antibiotics has, in general, resulted in a 15 percent improvement in daily gain and a 10 percent improvement in feed efficiency.

The advent and development of the Specific Pathogen Free (SPF) program, in the period 1957 to 1959, has made it possible to use pigs free from many of the common swine disease. This makes for clearer and more reliable results in the nutrition trials. The results are not confounded with disease and sickness.

A new development in swine nutrition is the use of "probiotics". These are substances that contain types of microorganisms (lactobacilli) that contribute positively to the nutritional status of the animal. They suppress undesirable microflora and enhance the growth of favorable microorganisms. Too, it has been projected that probiotic organisms may enhance nutrient uptake from the gastrointestinal tract.

Considerable research has been conducted on the nutritional value of feedstuffs for swine. One significant find was that opaque-2 corn (commonly called high lysine corn) has a significantly higher quality protein than normal hybrid corns. Nebraska research with "high lysine" corn indicated that 2 percent less protein is needed in the diet of all classes of swine when opaque-2 corn is used as the base cereal in swine diets.

The new direction in swine management, from pasture to intensive confined production, has brought with it some necessary changes in feed handling. One of the problems with confined feeding programs has been the problem of noxious gases. It has been found that the addition of 5 percent tallow to the ration cuts down the airborne bacterial count by 50 percent; airborne dust particles by 75 percent and the amount of ammonia produced by 40 percent. A marked increase in the health and well being of both the animal handlers and animals themselves has resulted.

Beef Nutrition

In the pre-World War II era, beef cattle research was largely in the area of "grading up" the common stock and expanding the use of the pure breeds. These were largely the Hereford, Angus and Shorthorn breeds. Considerable time and effort were expended in showing at the large regional and national livestock shows.

The nutritional work was largely a series of feeding trials. These were often composed of comparison and evaluation of home grown feeds. Various combinations and levels of feedstuffs were tried evaluating the economy and rapidity of growth and gain. Some of the most common questions asked concerned the value of feedstuffs produced during periods of abnormal weather, e.g., soft corn and drought damaged corn silage. How good are these and how can they be used?

In the early days little in the way of statistical analysis could be done because the lots were not replicated and the feed and weight records were on a lot rather than an individual basis.

By the end of World War II tremendous technical strides had been made. More detailed chemical and statistical analyses became widespread. The study of experimental design, widespread use of desk calculators, and the subsequent evolution of digital computers made it possible to set up more complicated feeding trials and thereby to obtain more meaningful and clear-cut answers to the questions being asked.

Equipment and handling large animals are expensive so the first changes merely entailed the replication of lots. The facilities of the Field Laboratory at Mead[8] made it possible to feed more animals in complex experiments as well as to feed and weigh single animals. This was followed, particularly after the laboratories in Marvel L. Baker Hall were completed, by work on individual animals. Many ideas were tried in the laboratory with artificial rumens and individual digestion trials before they were taken to Mead and tried in more practical trials.

Pens were built at Mead that would handle 25 to 45 head at a time. It was thought the larger trials would more closely approximate commercial feedlot conditions and, therefore, be more meaningful to feeders. The initial cost of the large numbers of cattle soon proved to be prohibitive, so most lots were divided and smaller numbers per lot were used. The lots were replicated, giving more statistical control and more accurate results. Often the trials were repeated for several years, thereby gaining yearly replicating so that an intra-year variance could be obtained.

Hand in hand with the refinements in experimental design went refinements in rations and the evaluation of feedstuffs. The use of nonprotein nitrogen and feed additives was studied.

Evaluation of protein nitrogen was also extended into those portions that were directly broken down in the rumen and those portions that were not broken down but were available for use directly by the animal after absorption from the intestine, the so called "by-pass" protein.

Chemical treatment of crop residues has increased digestibilities. Residue quality has also been affected by variety, date of harvest and whether the crop was irrigated or not. The treatment of wheat straw with ammonia made the straw comparable in feeding value to low grade prairie hay.

Fundamental studies with high moisture corn have established that the primary problem is acidosis. The Department is recognized as one of the leaders in acidosis research. It has been established that grains are digested at different rates and that feeding mixtures of grains is beneficial in reducing acidosis. Extensive research on ionophores, such as Rumensin and other additives, has also been conducted.

Systems of grazing cornstalks and milo stubble with cow herds and growing cattle have been evaluated. More efficient utilization and supplementation of summer pasture has been investigated. Both species and varieties of pasture grasses have been evaluated. Supplementation methods for increasing efficiency of utilization by growing cattle were also studied.

Swine Breeding (20)

The early swine breeding work was largely confined to the use of purebred sires and changing of type. Lard had been recognized for many years as a low value product. The breeders, therefore, were interested in reducing the fatness of their swine. The most common type after the old "razorback" lost favor was the short, fat "roly-poly". These animals did not meet market demands and so the type was changed rapidly to the "tall stilt" type. Fat production was reduced only slightly and reproduction was not increased.

To bring a more unified attack on the problem of excess fat as well as the overall improvement of swine production, the Regional Swine Breeding Laboratory was formed in 1941 with headquarters at Ames, Iowa. The Swine Breeding Laboratory encompassed 11 Midwest universities, including Nebraska, and the USDA. Its influence was far-reaching for it showed that research people from several independent universities could pool their ideas and work harmoniously, sharing ideas, techniques and animals. On the basis of the actions of the Swine Breeding Laboratory, other regional organizations were formed and regional projects were initiated.

In the early days of the Swine Breeding Laboratory, work at most stations involved the formation of inbred lines. The work was patterned after the corn breeding program. At Nebraska, Durocs were used as the experimental breed. Many lines were started. Usually a male and three females from the same litter were purchased to start a line.

Many of the small lines were lost or discarded in the first two generations for one or more reasons. If

[8]Now the Agricultural Research and Development Center

a line survived the first two generations, an effort was made to expand the line. Selection was largely on the basis of growth rate and feed efficiency from weaning to 112 days of age. The cull males were castrated at 112 days. All animals were weighed off test at 154 days of age. Final selections were made at this time.

In the late 1940's, it became apparent that inbred lines would not serve the needs of the swine industry. Commercial interests took up the information on crossbreeding before the Swine Breeding Laboratory had an adequate chance to evaluate and measure the gain in traits from the hybrid vigor resulting from the crosses.

During this period selection was based largely on overall growth rate, feed efficiency, and depth of back fat. Heritability was calculated for many traits. Litter size was largely unaffected by selection.

An outgrowth of the crossbreeding work was the formation of "gene pool" stocks. These pools were the result of crossing a number of pure breeds in all combinations and combining these crosses into one synthetic stock.

Since the mid 1960's, the "gene pool" herd (14 breed composite) has been used to evaluate the effectiveness of selection for reproductive traits. Ten generations of selection were completed for ovulation rate by performing a laparotomy or laparoscopy on each gilt and actually counting the number of ovulation sites on the ovaries. This experiment produced the first evidence in pigs that the ovulation rate component of litter size is quite heritable even though litter size is lowly heritable. Select line gilts ovulated about four more ova than control line gilts after 10 generations of selection. However, litter size at birth increased only 0.75 pig due to increased prenatal mortality which accompanied the increase in ovulation rate.

Beef Cattle Breeding (21)

Beef cattle breeding research was conducted at the Burlington, Rogers Memorial and Dalbey-Halleck Farms. In 1949 the major work was transferred to the Fort Robinson Beef Cattle Research Station near Crawford. This work was done in cooperation with the USDA. When the U. S. Meat Animal Research Center (MARC)[9] was started in the late 1960's, the animals and experimental work at Fort Robinson were moved to Clay Center. It is still being done there. This research has provided significant information relating to performance testing, selection effects, crossbreeding and breed evaluation.

In 1967, through joint financing by the University and USDA, arrangements were made to bring a senior, outstanding geneticist, Gordon E. Dickerson, to Nebraska. He was stationed on the East Campus but his research has been primarily with the other scientists at the RLH US MARC. Robert M. Koch, although remaining on the University staff, transferred headquarters from the East Campus to Clay Center.

The initial research, which began with the development of inbred lines, developed a data bank of performance records and exposed several deleterious hereditary defects. One of these was dwarfism, which plagued the major beef breeds during the 1950's. Research established that dwarfism was inherited as an autosomal recessive, i.e., it required the presence of two dwarf genes for visible expression. Research concentrated on techniques to distinquish dwarf gene carriers (heterozygotes) from normal animals. Bone formation, including x-rays of the lumbar vertebrae, hormone levels, insulin stress, and various blood parameters were investigated. None of the techniques was considered accurate enough for use by breeders. Progeny tests and pedigree evaluation became the means by which the industry resolved the problem. Marvel Baker was a leader in research on dwarfism.

A beef cattle selection experiment, conducted over a 25-year span, indicated that selection was effective in making slow but steady changes (one-half to three-fourths percent per year) in growth traits. Sires accounted for over 80 percent of selection applied. Yearling weight was more highly heritable and gave 87 percent more response than weaning weight. Final weights of steers from selected lines were 95 to 150 pounds heavier than controls and 22 to 50 pounds heavier at weaning. Correlated response at birth was 8 to 12 pounds, which required more assistance at calving for selected heifers. Carcasses from selected lines had 1 to 2 percent less fat than controls when compared at equal weight.

About 70 percent of cattle marketed today are crossbred. Heterosis achieved through crossbreeding can increase calf weight weaned per cow bred by more than 20 percent. The value of heterosis can be sustained in a continuous three-breed rotational crossbreeding system. (See also Part VI, Chapter 7 and 8).

Sheep Research (22)

Sheep production in Nebraska has never been as important to the economy as beef production. Sheep research, therefore, has not been as intense or extensive as swine or beef research. In the early days, work of a practical nature was undertaken. Feeding trials were conducted using corn and alfalfa as the basic ingredients. The role of wheat, oats and soybean oil meal in growing and fattening rations was also studied. Pasture management research included studies on rotational vs continuous grazing, and the use of cool vs warm season grasses, and stocking rates. These studies were undertaken both at Lincoln and at the Field Laboratory at Mead when it became part of the University.

The production and marketing of superior lamb carcasses were studied starting in 1968. The heritabilities of the various selection criteria were deter-

[9]Now the Roman L. Hruska U.S. Meat Animal Research Center.

mined. Hormones affecting the energy efficiency of the animals were studied. The hormones were either fed or injected. The animals were slaughtered and the carcass data were obtained.

Meat Laboratory (23)

The meat laboratory was started as and remained for many years a service organization for the rest of the Department. It was not expected to initiate research projects on its own but rather to provide support to the other animal science research projects.

In 1952, a nutrition study using tallow as a source of energy to replace some corn was started. The animals from these trials were slaughtered and carcass data were obtained. It was found that tallow could be used in the ration and that no changes were brought about in the carcass composition. In a few years both the large feed companies and the feeders incorporated the use of tallow in their programs, thus eliminating need for further work. A side observation on the tallow work was the discovery by the manufacturers that the inclusion of fat in the ration meant that the pelleting machines would not wear out as rapidly as without the fat. The tallow allowed the pellets to slide through the dyes with less friction.

A study on sex differences between steers, heifers, and "bullocks" (young bulls about 12 months of age) on growth, rate of gain and fatness was undertaken using animals from the Dalbey-Halleck Farm. When these animals were slaughtered, it was found the heifers had fattened more rapidly than the steers or bulls. The young bulls, however, had made the most efficient and rapid growth. There was little or no difference in tenderness between the three sex types of animals.

Meats research as related to and aimed at finding out about meat itself was started at Nebraska in the 1960's.

The first research was in the area of manufacturing and processing as affected by nutrition, physiology and breeding on the finished product. After several years, studies were started in the area of meat chemistry. Ways of prolonging the shelf life of meat and slowing down the rate of spoilage were investigated.

Newer areas of research have been in the fields of muscle growth and development, meat cooking, restructured meat products and emulsion products such as sausage, and in precooking, packaging and palatability improvement

Small Animal Colony (24)

In 1958 a small animal colony (rats) was started in a laboratory on the second floor of the Horse Barn. One large classroom was remodeled for this purpose. The room was sealed and temperature and humidity controls were installed. The foundation animals came from eight research institutions around the country. The animals were used primarily for genetics research, but also for nutritional and physiological research. This laboratory was used by graduate students as a teaching tool to carry on class nutrition projects. It was also used for thesis research problems.

When the Department moved to Marvel L. Baker Hall, two separate but adjoining laboratories were built. The physiology section had a small laboratory and several isolation rooms. Quantitative genetics and nutrition had two large laboratories as well as hot and cold rooms.

Small animals are used for research because they are cheaper to use than large animals and results can be obtained more rapidly. At present, rats, mice and Coturnix quail are being used.

Extension

Howard R. Smith—and Challenger

Long before the Extension Service was formally established, H. R. Smith brought animal husbandry work at the College to the attention of Nebraska's livestock industry.

Perhaps nothing did as much to give a young department standing as showing the steer Challenger to the grand championship at the International Livestock Show at Chicago in 1903. According to W. J. Loeffel, Smith acquired Challenger for the University while making a study of feeding practices followed by Nebraska feeders. In the feedlot of a Mr. Murphy at Vesta, he noticed a blue roan steer with an especially broad back and deep, full quarters. Although he had no authority to buy, he could not resist purchasing the steer for 5 cents per pound (1, pp 7, 8).

Smith did much to develop excellent relations with the livestock marketing agencies at Omaha and to popularize the School of Agriculture (3, p 9). He also pioneered Feeders Day, an event that brought thousands of people to the campus to see the results of feeding trials. (See also Feeders Day in this chapter.)

Smith, who was head professor of Animal Husbandry from 1906 to 1911, incurred disfavor with the University Board of Regents when he worked toward moving all of the Lincoln units of the University to the Agricultural Campus. In an interview with George Round, H. J. Gramlich said Smith "made the unfortunate mistake of being seen one day at the Capitol Building working in favor of having the University out here. . ." and he was demoted from head professor to professor of animal husbandry (26)[10].

In 1912, Smith moved to the University of Minnesota as Chairman of the Department of Animal

[10]The Regents' minutes for June 12, 1911 includes this report: "In the matter of the status of Professor H. R. Smith and others, Professor Smith is heard in defense of complaint of his activity touching legislation affecting university interests, in violation of the rules of the Board. On motion of Regent (V. G.) Lyford it is ordered that Professor H. R.Smith is hereby reappointed professor of animal husbandry. . ." (from head professor) effective September 1, 1911.

Husbandry. He was awarded an Honorary Doctor of Agriculture degree by the University of Nebraska in 1944. At this time he was working with the Livestock Loss Prevention Board in Chicago to eliminate tuberculosis in livestock (3, p 9).

Demonstrations

In early Extension work, hog slaughtering and pork cutting and curing were popular projects. In his history of the Animal Husbandry Department, Loeffel wrote that 16 precinct chairmen were brought to a garage that had just been completed in Seward. Each man brought a pig. A pig killing bee was held and the carcasses chilled out. The next day, the carcasses were cut up, sausage made and the meat placed in cure. It was planned that each precinct chairman was to give similar demonstrations in his home county (1, p 34). Precinct chairmen were volunteer leaders for precincts or townships.

In 1918, Nebraska farmers ordered 9,000 ewes to establish farm flocks. There were more orders than ewes. There was a growing demand for purebred sires. Extension provided butchering, lamb docking, shearing and judging demonstrations. A field demonstration in lambing out 600 western ewes was held on the George Berry farm at Norfolk (1, pp 34, 35).

In 1920, extension animal husbandry and agricultural engineering workers assisted in planning and constructing many community sale barns. Two hundred thousand pounds of wool were pooled. Thirty-two county livestock organizations were formed (1, p 35).

W. W. "Bill" Derrick (right), extension animal husbandman from 1931 to 1957, conducting a Hereford tour sponsored by the Nebraska Hereford Association and the Extension Service. With Derrick are Henry Mousel (left) and Robert Mousel of Cambridge, Nebraska, nationally known Hereford breeders.

In 1922, nearly 1,000 farmers pledged to use only purebred sires and more than 3,500 purebred sires were obtained through the assistance of county extension agents. Progress was made in tuberculin testing; 31,915 head of cattle were tested. Boys and girls clubs were emphasized (1, p 35).

An important extension activity following the extreme drought of 1934-36 was the pasture-forage-livestock program (see Part II, Chapter 4).

In an effort to meet the acute manpower shortage during World War I, big team hitches were emphasized. In the past, horses and mules had frequently been hitched abreast. This caused considerable side draft and sometimes caused overheating of "inside" horses.

The Horse and Mule Association, headquartered in Chicago, proposed a new method of hitching whereby the teams were "strung out" and "tied in and bucked back." This eliminated side draft and overheating and made it possible to hitch a green team. With a good lead team, a green team was powerless to cause trouble (1, p 36).

Feeders Day

Feeders Day, which gave Nebraska farmers an opportunity to see first hand the results of cattle feeding experiments at the College of Agriculture, was started by Howard R. Smith in 1911.

When winter feeding experiments were completed that spring, Smith thought the results were so interesting that he invited farmers and feeders to come to the campus to see them. The turnout exceeded expectations. Visitors viewed the experimental cattle from hay racks and wagons that lined the feedlot east of the Livestock Judging Pavillion (29).

Feeders Day grew in popularity, taxing to capacity the available facilities. Attendance the second year was 4,500. The idea spread across the country until nearly every state where cattle feeding was an important industry had a feeders day (3, p 9).

One of the early Feeders Days was held on a hot May day in the assembly room in Agricultural Hall. The entire group adjourned to the lawn under the shade trees which proved more comfortable. Crowds exceeded the capacity of other facilities including the Judging Pavilion.

As soon as the College Activities Building was completed in 1926 the meetings were moved there, but even this sometimes proved inadequate. On several occasions, "rump sessions" were held in the Agricultural Engineering Building and on the adjacent lawn where the speeches were "piped in" by public address systems (29).

Later, bleacher seats borrowed from the Athletic Department were erected where the experimental cattle were exhibited.

In the early days excursion rates were offered by some of the railroads. County extension agents, banks

and feeders' organizations brought groups to Feeders Day by special trains. Later, banks brought in bus loads of their feeder customers.

In a talk prepared for the 50th annual Feeders Day in 1962, W. J. Loeffel [11] told this story (29):

H. J. Gramlich enjoyed mingling with the crowd and asking, "Why did you come to Feeders Day?" One day he got a reply that at first puzzled him. One man responded, "To see how many people are here." Pressed for more information, the respondent said, "When there is a big crowd, I go easy on my feeding operations. When the crowd is small, I fill my lots."

Loeffel said he recalled one occasion when the date for Feeders Day was set without much research and "it just happened to fall on Arbor Day." A number of those present felt that a grave error had been committed in setting the meeting on a national holiday which was established through the efforts of a Nebraskan, J. Sterling Morton. Two staunch advocates of Feeders Day (Charley Graff and Elmer Youngs) made a hurried search of Lincoln nurseries and shortly returned with a tree and the tools to plant it. "The entire group was assembled on the lawn in front of the College Activities Building where, after a brief ceremony, the tree was planted. The group reassembled in the Activities Building and the program was resumed. . ." (29).

Many women attended Feeders Day and beginning in 1926 the Home Economics Department cooperated in offering a women's program (1, p 9).

In 1963, Feeders Day on campus was discontinued in favor of smaller meetings at various locations in the state. In recent years a Large Feeders Short Course has been held at the Nebraska Center—the last in 1985 (30).

Beginning in 1935, the Animal Husbandry Department held an annual hog feeders day or Rooters Day. It failed to attract crowds as large as those for Feeders Day. In the fall of 1961, the Department began to move Rooters Day from place to place in the more important swine producing sections of the state and the name was changed from Rooters Day to Area Swine Days. In 1986 the name of the meetings was again changed to Whole Hog Days (31).

Other extension work is described under Related Organizations and the Livestock Development Program in this chapter.

The Livestock Development Program

In the early 1970's, projections were for substantial increases in demand for red meat, particularly beef, by the mid 1980's. At that time less than half the feed grain produced in Nebraska was being utilized for livestock in the state.

Nebraska farmers had a sound background for increased livestock production and, in fact, had doubled fed beef production in the previous decade. The animal science extension program had focused on livestock development in the 60's and Paul Guyer had organized several tours for Nebraskans to visit pro-

[11] Professor Loeffel was scheduled to discuss "The Past Fifty Years" at the 50th Annual Feeders Day, but was hospitalized two days before the event. He died a few weeks later on May 5, 1962. Quotations in this section are taken from his prepared text.

Feeders Day in 1931. This annual event was started in 1911 by Howard R. Smith to give Nebraska farmers an opportunity to see first hand the results of cattle feeding experiments at the College of Agriculture.

ducer areas in other states[12].

Beef slaughter plant capacity had been increased to handle more meat animals. The rapid growth in cattle feeding in the 50's and 60's changed Nebraska from a feeder exporting state to one of importing feeder cattle— nearly twice as many were imported as were born in Nebraska (32).

At the beginning of the 70's, most signs seemed to point toward an opportunity for continued expansion of Nebraska's livestock and supporting industries.

Chancellor D. B. Varner[13], sharing views expressed earlier by Frank Baker, chairman of the Animal Science Department, proposed an ambitious development program to leaders of the state's livestock industry. A Livestock Development Committee was appointed, with many subcommittees involving all segments of the livestock and associated industries.

The Committee was chaired by H. W. Harrington of Grand Island and included feeders, ranchers, bankers, packers, feed manufacturers, and representatives of the University, the news media and state government.

To assist in the program, four extension specialists were added to the staff - Keith Gilster, Lincoln campus; William Zollinger, Southeast Extension Headquarters at Lincoln; Phil Menke, Northeast Station at Concord; and Jim Heldt, North Platte Station.

In a talk at Grand Island in 1972 (33), Varner expressed concern that Nebraska-produced grain was moving out of the state when packing plants in Nebraska were not getting enough live animals to operate at full capacity. He said our grain is being "fed somewhere else to someone else's livestock." The plan called for doubling our calf production in Nebraska during the 70's.

Early emphasis in the development program was directed toward financing an expanded industry with particular focus on financing cattle on feed since other states were getting financing from wider areas than was true for Nebraska.

A second focus was on increased utilization of crop residues. These for the most part would be used by the increases in our cow herds.

A third focus was on confinement swine production and the potential it had compared to open lot production.

There was a great deal of support for the program from livestock producers. Robert Raun of Minden wrote: "There is no doubt that expansion of the meat industry in Nebraska offers one of our great opportunities for economic growth. This expansion must start on the farm, and we should get on with it as soon as possible" (34).

Willard Waldo of DeWitt said at a Pork Industry Development seminar: "The best possibility Nebraska has for lasting economic development in the decade ahead is in converting nearly everything that can be grown on the land into marketable products. There is no reason Nebraska cannot become the top red meat producing state in the nation" (35).

There was not complete agreement about the program, however, within the College of Agriculture. Glen Vollmar, chairman of the Department of Agricultural Economics, had some words of caution for the individual producer.

In a *Nebraska Farmer* article titled "Look before you leap" (36), Vollmar wrote that "the farmer or rancher must see profit opportunities (for himself) and should not be encouraged to produce for the sake of generating dollar flows within the state's economy. This would be a very short run approach and would last only as long as producers' capital resources would hold out."

"Having some roughage or feed grain available for feed is not sufficient reason to enter into or expand in the livestock business," Vollmar advised. "The manager must use the feed and roughage available and other inputs in a manner which will yield more profits than other alternatives open to him."

Vollmar did not stand alone with this view. He had agreement from some banks, other lending institutions, and producers who were not convinced about profit opportunities for farmers as Nebraska's economy developed (37).

The extension tours in the 60's had raised some caution flags about increasing cow herd emphasis in Nebraska since so many states were already in the process of emphasizing increases in cow herds.

The program did not generate the hoped for increase in calf production. Calves born in Nebraska totaled 2,130,000 in 1972; 2,200,000 in 1973; and 2,300,000 in 1974. From that point there was an irregular decline to 1,750,000 in 1985. Nationally, cow herds had declined much more than in Nebraska (38).

On the other hand, livestock feeders — especially larger operators — benefited by contacts made through committee activities for broader financing and support for the feeding industry. Nebraska cattle numbers increased in the face of declining total numbers in the U.S.

The state's cattle marketing declined slightly from 4,288,000 in 1972 to 4,144,000 in 1974, but increased substantially to 5,357,000 in 1984.

Cattle prices increased over the years ($43.80 per hundred pounds in 1972 compared with $62.60 in 1984), and cash receipts from marketing cattle and calves more than doubled in the same period — from $1.5 billion to more than $3.6 billion.

Hog marketings ranged from 5,203,000 in 1972 to 5,007,000 in 1977 and then up to 6,026,000 in 1983. Cash receipts from hogs rose from $318,977,000 in 1972 to $635,407,000 in 1984 (38).

[12]In 1968, 70 feeders participated in a feedlot tour to Texas and Oklahoma. The next year there was a similar tour to confinement lots in Iowa, and in 1971 a tour to Mississippi and Louisiana gave producers and order buyers an opportunity to purchase feeder cattle in those states.

[13]Title changed to president in 1972.

Reflecting on the program from the vantage point of 1986, Paul Q. Guyer, secretary of the Beef Industry Task Force of the Livestock Development Committee, offered this analysis:

> "Unforeseen factors had a great influence on the impact of the program. Grain exports increased the cost of feeding drastically in the mid 70's. The OPEC Oil Cartel price increases changed our economy substantially, decreasing demand for beef. The result has been unstable profits for the beef feeding industry and little or no profits for the cow-calf producer in the intervening years. This has resulted in a substantial reduction in Nebraska's beef cow herd and a shift in cattle feeding from the smaller farmer feedlots to large farmer and commercial feedlots where more sophisticated management, financing and marketing is (sic) practiced.
>
> "However, the program for swine has added stability and slight increases in swine production in Nebraska" (32).

Long Time Staff Members

The following have served 25 or more years on the staff of the Department (all have been located on East Campus except as shown in parentheses):

Charles H. Adams, Martin A. Alexander, Vincent Arthaud, Guy N. Baker (North Platte Station), Marvel L. Baker, Cecil T. Blunn, Edgar A. Burnett, Donald Clanton (East Campus and North Platte Station), D. Murray Danielson (North Platte Station), W. W. Derrick, Ted H. Doane, Howard J. Gramlich, Keith E. Gregory (East Campus and USMARC), Paul Q. Guyer, Edward W. Janike, Robert M. Koch (East Campus, Fort Robinson, USMARC), William J. Loeffel, Leo E. Lucas (East Campus, North Platte Station), Ernest R. Peo, William P. Snyder (East Campus, North Platte Station), Walter Tolman (East Campus, Northeast Station), Richard B. Warren, and Dwane R. Zimmerman.

Related Organizations (25)

Nebraska Livestock Breeders and Feeders Association.

In 1892 the Nebraska Livestock Improvement Association was formed. It was a part of the Organized Agriculture program and received funds from the Legislature. In 1931 the name was changed to the Nebraska Livestock Breeders and Feeders Association because many feedlot operators wanted to be members.

After 1949, when Organized Agriculture ceased to hold annual meetings, it continued to meet in conjunction with Feeders Day. Feeders Day became a spring function of the Department, held at the end of the winter feeding period when the experimental animals were either ready for market or were ready to go on summer feed.

Rooters Day became a fall function of the Department and was independent of the Livestock Breeders and Feeders Association.

The Livestock Breeders and Feeders Association continued to help defray the cost of the Feeders Day report as long as Feeders Days were held. It also helped pay for outside speakers for the Feeders Day meetings. When Feeders Days ceased to be held on the College campus in the early 1960's, the Livestock Breeders and Feeders Association became an organization of organizations, i.e., a number of breed associations and trade groups became part of the Livestock Breeders and Feeders (23 were listed in 1985). An annual meeting of this overall group was held but the meetings became less and less well attended. When the Legislature stopped funding the agricultural groups in 1985, the Livestock Breeders and Feeders Association voted itself out of existence.

NE Swine Council/NE Pork Producers Association

The first official meeting of the Nebraska Swine Council was held in May 1961. The Swine Council goals included promoting the production of pork; providing a voice for swine producers in the Legislature; promoting better breeding, growing and marketing of swine; encouraging more swine shows and market contests (and as a corollary, establishing statewide standards for conducting and judging these shows and contests); furnishing the media with news and reports of progress; and supporting programs which are in the best interests of the swine producers.

In the beginning most of the members were purebred breeders and the annual meetings were held in the northeast part of the state. Gradually commercial producers became members. The meetings were also moved around. The 1967 meeting was in Columbus, Nebraska.

Leo Lucas, as an extension swine specialist, was instrumental in formation of the Swine Council and served as its executive secretary from 1965 through 1967. In 1968, Terry Schrick was employed as executive secretary and the University provided some financial support for a term of three years. After that all revenues came from a producers' voluntary marketing check-off. As a result the University was no longer directly involved with the day to day functions of the Swine Council.

The Council played an active role in helping organize the National Swine Growers Council. The NSC has continued to be active in the national organization. It helped with the final passage of the mandatory national check-off system which started November 1, 1986.

In 1973 the Nebraska Swine Council amended its constitution and bylaws and the name was changed to the Nebraska Pork Producers Association. It continues to operate under this name. Although the NPPA is entirely independent of the Department of Animal

Science, there is a close working agreement between the two. The NPPA helps defray the costs of Area Swine Days (now Whole Hog Days) each year.

International Programs (27)

The Animal Science Department has had a role in the International Programs Division since its inception. Marvel L. Baker was the first dean and chief of staff of the Faculty in Turkey. He served his time in Ankara, getting the program organized and implemented in the Turkish Parliament. Cecil T. Blunn taught in Ankara University while two Turkish professors were in the United States. When Ataturk University was organized in Erzurum, Baker returned to head the program. M. A. Alexander and Ted H. Doane taught in the new Department of Animal Science and helped set up both research and extension programs.

Later, the University of Nebraska undertook a cooperative program in Colombia, South America. Thomas W. Dowe, a long time animal science staff member at the University of Nebraska before going to Vermont as dean of the College of Agriculture, again served Nebraska as director of the Mission in Colombia from December 1970 to July 1972.

Others in the animal science discipline with appointments in Colombia were D. D. Bullis, D. H. Bushman, G. O. Conley, P. Dishpande, L. C. Garrison, L. E. Lucas, C. V. Ross and H. H. Stonaker.

Beginning in December 1967, the Department has provided instruction in the animal science segment of the Nebraska 4-H/Japan-Labo Exchange (see Part V, Chapter 13). Courses in beef, dairy, poultry and swine production constitute the curriculum. Funding is provided by the Japanese Agricultural Training Council of Japan. Approximately 40 students participate each year in a 12-week intensive course. Students who successfully complete the class work may earn eight hours of college credit.

Major Honors and Offices

Staff

Recipients of honorary doctorate degrees

Marvel L. Baker, Kansas State University	1949
E. A. Burnett, Michigan State University	1917
Wesleyan Univ., NE	1933

Staff who have received the UNL Distinguished Teaching Award

Charles H. Adams	1971
Ernest R. Peo, Jr.	1972
P. J. Cunningham	1975
Bobby D. Moser	1977
Dwane R. Zimmerman	1979
Keith E. Gilster	1980
Ted H. Doane	1982
Richard B. Warren	1984
Dennis R. Brink	1986

Teachers chosen by former students as having the greatest impact on their lives, in response to a request which appeared in the Winter 1983 issue of the *College of Agriculture Alumni News*

Vincent Arthaud
John Ward

Recipient of UNL Distinguished Educational Service Award

Don J. Kubik	1987

Recipients of the USDA Superior Service Award

Edward W. Janike	1959
Gordon E. Dickerson	1984
Leo E. Lucas	1985

Served as chancellor of a major university

Edgar A. Burnett - University of Nebraska	1928-1938

Served as president of the American Society of Animal Science (prior to 1963 named the American Society of Animal Production):

Howard J. Gramlich	1929
William J. Loeffel	1936
Marvel L. Baker	1953
F. H. Baker	1973
I. T. Omtvedt	1985

Staff who have served as president of the American Meat Science Association:

Elton Aberle	1985

Alumni

Alumni who have been awarded honorary doctorate degrees by the University of Nebraska

Kenneth F. Warner	1954
Willard J. Visek	1980
O. Burr Ross	1982
Ned S. Raun	1984
L. Dale VanVleck	1986

Served as Governor of Nebraska

Norbert T. Tiemann	1967-1971

Served as member of the UN Board of Regents

Robert L. Raun	1966-1980

Served in the Nebraska Legislature

Willard Waldo, DeWitt	1957-1961
Jerome Warner, Waverly	1963-present
Lester Harsh, McCook	1967-1970
Loran C. Schmit, Bellwood	1969-present

M. L. Dierks, Ewing	1987-present
Roger Wehrbein, Plattsmouth	1987-present

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Chapter 8. Chemurgy[1]

Contents

Names of Department

Chemurgy Project	1941-1949	Department of Chemurgy	1949-1953

Administrators

Name	Title	Years Served
Leo M. Christensen	Research Executive	1941-1945
Harry Miller	Research Chemist, Acting Administrator	1945-1946
Carl W. Borgmann	Dean of Faculties, UN, Acting Administrator	1947-1948
Gerrish M. Severson	Project Chairman, Department Chairman	1949-1953
Robert L. Ogden	Acting Chairman	1953

Physical Location of Headquarters

Experiment Station Hall	1941-1949
Animal Science Meat Laboratory	1949-1952
Chemurgy Building (same building with new name)	1952-1953

Early History

First Appropriation

In 1941, the State Legislature passed a bill (LB 462) that provided for establishment of a Chemurgy project in the University, to be administratively directly under the Board of Regents. The project was funded by an appropriation of $25,000, which became available on August 26, 1941. Active work started on September 1, 1941.

An office and laboratory were set up in Experiment Station Hall on the College of Agriculture campus. Subsequently a second laboratory was equipped in Bessey Hall on the City Campus (1).

Leo M. Christensen, on leave from the University of Idaho, was appointed research executive in 1941. When Christensen resigned in 1945 he was succeeded first by Harry Miller (1945-1946) and then by Carl W. Borgmann (1947-1948), both in an acting capacity.

Chemurgy was continued as a project until 1949, when it was formalized into a Department of Chemurgy in the Agricultural Experiment Station.

Gerrish M. Severson who had been a research chemist on the original project staff returned as leader of the project for a short time and then became chairman when the Department of Chemurgy was established. He served until 1953. Robert L. Ogden was acting chairman during part of 1953.

During its somewhat brief existence as a formal department, Chemurgy was housed in the Animal Science Meat Laboratory (known also by a variety of other names). In 1952, the name was changed to Chemurgy Building. It was razed in 1964 and the area became the present site of a portion of the East Union.

Toward the end of 1953, the Departments of Chemurgy and Agricultural Chemistry were merged into a new Department of Biochemistry and Nutrition (5). The former agronomic and economic aspects of the Chemurgy Department were transferred to the Departments of Agronomy and Agricultural Economics, respectively.

After the initial funding of the Chemurgy Project in 1941, some faculty in the University seemed less than optimistic about continued legislative support and about the Project's chances for success.

Chancellor C. S. Boucher asked the University Committee on the Development and Use of Nebraska Resources for recommendations "relating to the Chemurgy Bill."

Referring to this "new responsibility put upon the University," the Committee wrote that "the Project" [2] may be considered to be on an uncertain basis, since we foresee the legislature's review of its own plan, two

[1]The authors gratefully acknowledge the assistance of Robert L. Ogden in the writing of this chapter.

[2]The Committee said it "specifically avoided the use of the term 'Chemurgy' because of its lack of definition and clarity."

According to Robert L. Ogden (4), the term "chemurgy" was coined or at least first used by William Hale, a DuPont research-scientist-executive in the 1930's. Ogden believes resistance to the name "chemurgy" was a misunderstanding of the concept (industrial utilization of organic raw materials, especially from farm products), or an unwillingness to use or adopt new terminology.

years hence, when the question of continuance of financial support comes up.

"By that time, if it is an established agency in a regular department of the university, it is likely to lose its identity in that of the department and 'be allocated to the university, without increase in appropriations,' as one of our former governors was wont to say. If not successful enough to be commended, the department having charge of it will have to bear the onus of failure. Moreover, it is impossible to chart with assurance the course of its development.

"For the time being, therefore, the work probably should be independent of other streams of activity, and be given time to cut its own channels . . ."

In the same letter the Committee reported unanimous agreement "that the operation of the new unit must be university-wide, although its most obvious implications relate to agriculture and industrial chemistry . . ."

The Committee again expressed concern about possible failure when it recommended that the research executive for the Project be a full-time employee, "since the university will be subjected to criticism if nothing is accomplished in the short time before another legislature meets" (2).

Fears about termination of legislative support in the next biennium proved unfounded. ". . . the Legislature again appropriated funds for chemurgic research at the university, this time as part of the University budget," according to the Second Annual Report of the Nebraska Chemurgy Project (3).

Strong Support from Agriculture and Business

The Project also gained strong support from Nebraska agriculture and business. In 1945 it was the University Regents who were chided for what western Nebraska citizens believed was inadequate funding for chemurgy.

The Lincoln Journal carried this story in its November 10 edition that year: "Protesting the allotment of only $10,000 to the chemurgic research department . . . as opposed to an expected $113,000, representatives from the panhandle district met with the university Board of Regents Saturday morning to ask authorization of a plan to receive industrial endowments for more extensive experiments with safflower. (See also *Safflower* in "The Search for New Crops", Part II, Chapter 3.)

"Ben J. Sallows, Director of the Alliance Safflower Company and publisher of the *Alliance Times-Herald*, told the regents that farmers in the western part of the state 'would like to see you divorce chemurgic research from the university, and set it up as an independent institution, directed by a board from the university.' "

"Frank G. Arnold, Fullerton, president of the Nebraska Federation of County Taxpayers Leagues, stated that the action of the regents in cutting the chemurgy allotment is 'muffing a chance to make Nebraska great among farming states.' "

"Sallows and Arnold told the board that under the direction of Dr. Leo Christensen, who resigned in April 1945 as director of the project, as much as $100,000 could be raised in the western part of the state to support further extensive research work to determine whether . . . safflower can be used to enrich the protein quality of cattle feed. 'We think that . . . safflower is the answer to the need of ranchers, and would replace much of the necessity for bringing cotton seed oil from the south,' Sallows stated"[3].

Research

The Regents must have listened carefully to the concerns that western Nebraskans expressed about safflower research. Whatever the motivation, the crop received a great deal of University attention during the life of the Chemurgy Department and into the mid-1960's.

Research on safflower and other industrial crops (under the leadership of Carl E. Claassen from 1941 to 1950) is described in "The Search for New Crops." Outlined here is the Chemurgy Project's process-product research on alfalfa dehydration, ethyl alcohol, starch, vegetable oil, rubber and corncobs (4).

Alfalfa

Alfalfa dehydration was a young but rapidly expanding industry at about the same time the Chemurgy Project was becoming established. Technical aid to this new industry was viewed as one of the responsibilities of the Project.

Stabilization of the carotenoids in alfalfa was an objective. Initially, attempts were made to coat the alfalfa particles with starch or other gels or gums, but without success in controlling carotene stability.

The addition of saturated fats and oils, particularly those from animal sources, was found to be effective in stabilizing carotene in alfalfa products. Unsaturated and rancid fats or oils caused the carotene degradation to increase. The stabilizing effects of antioxidants developed by the USDA Western Regional Research Center, Berkeley, California, were found to be additive to good fats and oils.

The Project developed a "partial windrow drying before dehydration" system to reduce dehydration costs, and demonstrated a "multiple cutting" system to enable a dehydrator to tailor-make his product so

[3]According to the *Journal*, this session "marked the first meeting of the board of regents which has been opened to reporters in several years".

Since 1975, the Regents and other public bodies have been required to open their meetings to the news media and anyone else interested. The Legislature approved an open meeting law (LB325) on May 27, 1975. (Revised Statutes, 1943, State of Nebraska, Amended Sections 79-327 and 85-104.)

as to have any reasonable carotene and/or protein content desired.

The chemurgy staff developed procedures for pressing the juice from fresh alfalfa with a standard oilseed expeller and demonstrated that a high carotene, high protein, low fiber concentrate could be made by drying the juice.

They studied cutting regimens with regard to maturity of plant at cutting, and cutting height both as a single cutting and as an annual system.

They studied the effects of insects and diseases and their control on the yield and quality of alfalfa forage and dehy[4], and otherwise cooperated in the development of superior cultivars.

Ethyl Alcohol

This work involved 1) the use of carbohydrate materials other than corn or rye grain, i.e., wheat, grain sorghum, potato, jerusalem artichoke, beet syrup and molasses, and sweet sorghum juice; and 2) production of fungal and bacterial enzymes for use in the alcohol and sweet syrup industries.

Starch

During WW II, waxy starch used in the manufacture of tapioca became scarce in the U.S. because of the difficulty of shipping from the tropics where cassava, the traditional source of this type of starch, is grown. As a result private industry and publicly-supported scientists cooperated in seeking a substitute source. The seed of Leoti sorghum, which was already being grown in the state, contains this type of starch. Staff in agricultural chemistry, agronomy (including the Nebraska Grain Improvement Association) and chemurgy did work on utilization of Leoti sorghum grain for waxy starch production. Work was also underway to utilize waxy type corn as another possible substitute for cassava. Chemurgists also studied the isolation and utilization of starch from barley, potato, and grain sorghum.

Vegetable Oil

Studies included the problems associated with recovering oil from high oil content oilseed, i.e., safflower, sesame and castors, and determined successful processing parameters for seed preparation, pressing and/or solvent extraction.

The Department unsuccessfully tried to separate oils from oilseeds by bacterial fermentation of an oilseed mash.

Mint oil recovery was accomplished by using a press and steam distilling the press juice.

Use of Residues

The Chemurgy Department produced paper from wheat straw and other residues by adapting standard paper making processes, and demonstrated that usable plastic products could be made from plant residues and ethyl alcohol.

Rubber

Chemurgists at Nebraska (along with others including the USDA) studied the use of the juice from milkweed, guayule and Russian dandelion as latex sources for producing rubber. (See also "The Search for New Crops.")

Corncobs

The Department helped in the development of dry grinding corncobs to produce industrial soft grits for cleaning, burnishing and polishing by air blasting or by tumbling.

It also demonstrated that the fire-explosion hazard inherent in dry grinding corncobs could be nearly eliminated by wet grinding while retaining or improving the grit conformation.

Industrial Surveys

Nine industrial surveys were published on the following subjects: castors, surplus and cull potatoes, uses of straw, safflower, oilseed press cake, minor oilseeds, wheat straw collection, auxiliary feed nutrients and corncobs.

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[4]A term commonly used in the trade to denote dehydrated alfalfa.

Chapter 9. Dairy Science[1]

Contents

Names of the Department (22)

Dept. of Dairy Husbandry	1902-6/1963	Dept. of Dairy Science	6/1963-1968

Administrators (14)

Name	Title	Years Served
A. L. Haecker	Head	1902-1911
J. H. Frandsen	Head	1911-1919
J. H. Frandsen	Chairman	1919-1920
H. P. Davis	Chairman	1921-1949
Philip L. Kelly	Chairman	1949-6/3/67
T. Allen Evans	Acting Chairman	6/3/67-1/30/68

Locations of Headquarters

Name(s) of Buildings	Period occupied
The (original) Dairy Building[2]	(NA)
The (old) Dairy Bldg. (Rural Economics Hall, Poultry Husbandry Hall, Agric. Admin. Annex)[3]	1896-1916
Dairy Industry Hall (H. C. Filley Hall)	1916-1968

Early History

In 1875, long before there was a dairy department as such, there was a cow shed erected on the "Farm" at a cost of $97.50, and a fifteen acre pasture enclosed with a high board fence at a cost of $283.45 (7, 1944-45, p 174). Henry H. Wing, BA degree from Cornell University, who had a special interest in dairying, was hired as professor of agriculture in 1884. Wing also served as director of the "Farm" (14, p 41). He taught the first courses in dairying at the University, conducting classes on pastures and meadows, stock breeding, feeding and dairying (7, 1944-45, p 174).

The earliest report on dairy manufacturing research appears to have been A. L. Haecker's paper published in the Nebraska State Dairymen's Association annual report for 1896. It was entitled, "Cost of butter production" (25).

Henry H. Wing was listed as a member of the Station staff in the first report presented to the Governor on January 26, 1888 (14, p 53) and was a joint author of Bulletin No. 6, "Report of Progress" published by the Station in 1889 (14, p 55). Wing resigned his position June 15, 1888 (14, p 47).

The (old) Dairy Building with laboratories on the first floor, and offices on the second floor, was built in 1896. It was enlarged and veneered with brick the following year. By 1897 courses in dairying and related subjects had been increased to include studies of breeds, pedigrees, feeding rations, and a laboratory to learn how to test milk for butterfat content (7, 1944-

[1]The authors gratefully acknowledge the assistance of Crawford W. "Nib" Nibler, the late Philip H. Cole and Thomas A. "Al" Evans for conducting research and providing material for this Chapter.

[2]A two-story frame building, pictured in Jan 1909 with the caption "The original dairy building" (38). It is possible that the "original" dairy building was remodeled, added to and veneered with brick to become a part of the "old" dairy building.

[3]The first two "dairy" buildings predate the establishment of the Department of Dairy Husbandry.

45, p 174). The Department was formally organized in 1902, with A. L. Haecker as the first head.

As the years passed, courses were added to cover economic factors; home dairying; handling of cream; testing, churning and the grading and marketing of butter; and dairy cattle judging. Research on dairy cattle continued (7, 1944-45, p 175).

In 1907, work was started jointly by the Nebraska Dairymen's Association and the Station on production testing and keeping of records. Seven milk cows were assembled at the Station as entries in the dairy cow test, the object of which was to show the value of well bred dairy animals and to demonstrate the difference between cows with respect to producing ability and returns above feed costs—an obvious precursor to the DHIA's (15).

In 1913, J. H. Frandsen authored Station Press Bulletin No. 39, entitled "Pasteurization of milk and cream in the home." In 1919, in tune with the WW I effort, J. H. Frandsen, J. W. Revner, and John Luithly published Station Bulletin No. 168, entitled "Sugar-saving substitutes in ice cream" (25).

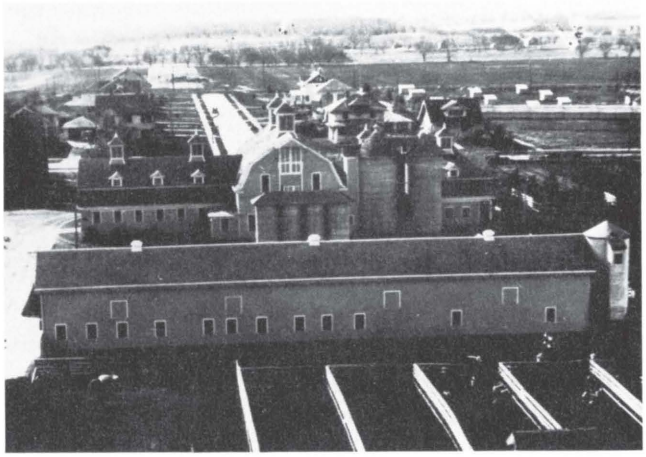
The Dairy Industry Hall (now H. C. Filley Hall) was completed in 1916. The numerous courses being taught required the addition of several assistants to the staff. Research was being conducted on the weight of dairy cattle and ice cream making (7, 1944-45, p. 176).

The 1914 Annual Extension Report (17) listed C. L. Burlingham, dairyman, the first extension dairy specialist in Nebraska. In the 1915 report, D. H. Propps, on loan from the USDA, was listed as occupying this position. The 1920 report stated "Extension work in dairy husbandry was discontinued from October 1, 1919 to June 30, 1920" because it took that long to get a replacement for the person who had resigned (17).

In 1917 (17), Extension emphasis was placed on providing assistance in purchasing dairy cattle, helping organize dairymen's associations in seven counties, and working with the four cow testing associations. In 1918, there were 39 cottage cheese-making demonstrations held. In 1919, successful dairy farms were selected to serve as demonstrations within their respective communities. The first mention in the Extension reports of dairy calf clubs was in 1920 when five clubs were organized.

On January 6, 1921, M. N. Lawritson reported to the Nebraska State Dairymen's Association: "Projects in mind for the coming year are cooperative bull associations, boys and girls club work, cooperative cow testing associations, and livestock improvement" (3).

In 1922, the first bull cooperative was organized. In 1923 there were two new cow testing associations, one new bull association and 21 dairy clubs. Throughout the period of 1917 through 1923, considerable emphasis was placed on assisting dairymen in purchasing better grades of animals (17).



Part of East Campus in the early twenties (looking south). Long building in foreground was part of the Animal Husbandry complex. In immediate background is the old dairy barn which collapsed in 1925. Light colored street beyond dairy barn is 38th Street.

Dairy Barn Collapses (23, 24)

At 6:15 p.m. on Friday, March 27, 1925, the main dairy barn at the College of Agriculture collapsed, killing three cows, badly injuring three or four more, and causing bruises to numerous others[4]. Walter Gloe, a milker, the only person in the barn at the time, escaped with only an injury to his foot. Had the hay loft fallen 15 minutes later, a milking crew of four men would have been at their work under the floor that fell.

The collapse consisted of the hay loft giving way and falling on the cows. The accident occurred because of an overload of an estimated fifty tons of feed having been stored in the hayloft. John Schnitter, an employee, reported that 400 sacks of cornmeal were stored in the loft earlier in the week and he said ". . . the loft was noticeably shaky then." H. P. Davis, chairman of the dairy department, said "As much or more feed had been frequently stored in the mow previously." E. A. Burnett, Dean of the College of Agriculture, stated "The building was erected in 1903 and could not be expected to stand the strain of the heavy sacks as it was intended for a hay mow."

The rescue work by those who gathered was carried out very efficiently. The cows trapped by the falling debris bawled a great deal at first but in time remained silent. Some were led out, but the remainder had to be freed by removing the feed and cutting away the loft floor under which the cows were trapped. "As a cow was released, a dozen men would surround it, heave it to its feet or drag it out bodily. Many cows were unable to rise at first but recovered later. Queen, the last cow to be removed, supported the weight of a beam for more than an hour before rescuers could get to her."

[4]The crash was heard by residents living south of Holdrege Street.

The barn was never rebuilt. It had been located on the east side of what is now Arbor Drive, east of H. C. Filley Hall, and south of what is now the C. Y. Thompson Library. By the fall of 1926 a new dairy complex, including the main barn, had been erected east of 39th street and opposite Center Drive.

About 300 persons attended the formal opening of the new complex on October 21, 1926. Chancellor Samuel Avery presided at the dedication. Dean E. A. Burnett pointed out that the University owned five dairy herds located as follows: ". . . largest one at Lincoln—others at the North Platte substation, School of Agriculture at Curtis, the Valentine experimental farm, and the Scottsbluff experimental farm" (27).

Today, in turn, all that remains of the complex built in 1926 is the small unit now known as the "Livestock Insect Research" laboratory.

Teaching (4, 7)

Courses, Enrollment and Advanced Degrees

In 1925, there were a total of 78 College students enrolled in the 10 dairy courses being offered. In addition there were courses taught in the School of Agriculture, and there were 28 students enrolled in the ice cream short course.

Enrollment in dairy department courses peaked during the period of 1948 to 1950. For example, in the academic year of 1948-49 , there were 14 courses taught during the first semester with a total enrollment of 243, and 13 courses during the second semester with 118 enrollees.

There was a trend of eliminating laboratories from dairy courses during the period of 1949 to 1967. The enrollment in resident short courses was declining which finally resulted in their elimination. The resident short courses were largely replaced by day and evening classes organized by Extension and presented in various parts of the state. Lawrence K. Crowe served as an effective and popular adviser to hundreds of undergraduate students during his period of service with the University.

There were a total of 35 master's degrees and three doctor's degrees awarded by the Department of Dairy Science.

Collegiate Judging Teams

Cattle (7, 8, 9, 21). The University of Nebraska first entered the National Dairy Judging Contest in 1908, a noteworthy event particularly because of the team members. Included were Karlis August Ulmanis who later became Premier of the Republic of Latvia; Howard J. Gramlich who became chairman of the Department of Animal Science in 1917; and V. S. Culver, who in 1924 was manager of the Minnesota Holstein Company.

In the close to 80 years since the first team was entered in national contests, Nebraska has failed to participate only a few times. Nebraska teams ranked first in 1909, 1912, 1916, 1918, and 1928.

Lawrence K. Crowe, dairy science professor from 1925 to 1968, was an effective and popular adviser to hundreds of undergraduate students.

For many years the breeds judged in the national contests consisted of Ayrshire, Brown Swiss, Guernsey, Holstein, and Jersey. More recently, Milking Shorthorns have been added.

Ray F. Morgan served as coach of the dairy cattle judging teams for many years. He was often assisted by an assistant coach, most noteworthy of whom was Elmer N. Hansen.

Dairy products (7, 1944-45, 10, and 25). The national dairy products judging competition was started in 1916 by the Official Dairy Instructors Association (later the American Dairy Science Association) with only butter being judged. Nine teams competed, including Nebraska. The second contest was held in Columbus, Ohio with Nebraska being one of only three teams competing. The three products judged were butter, cheese and milk. The Nebraska team was high in cheese judging.

Fifty contests were held during the period of 1916 through 1971. Nebraska had a team entered in 44 of these contests, a record surpassed only by Ohio State University. During this period Nebraska won the butter judging contest once (1937) and the cheddar cheese judging contest once (1917), the cottage cheese judging contest once (1967), but the teams were never able to bring home the all-products judging trophy.

P. A. Downs had the distinction of having coached and entered judging teams in every contest from 1924 through 1958. No other coach has ever had such a record of continuous, uninterrupted participation in the Collegiate Dairy Products Evaluation contests.

For two years after Downs retired in 1959, the University of Nebraska did not enter a team in the national contest. Kay Nilsen coached and entered teams in 1961, 1962, 1963. No team was entered in 1964. From 1965 through 1968 the team was coached and entered by T. Allen Evans.

Varsity Dairy Club

The Varsity Dairy Club was organized February 2, 1915 (31, p 328). It was stated in the 1930 *Cornhusker*: "The Varsity Dairy Club is the only student organization which has as its aim the development of interest in scientific dairying and the encouragement of better dairying in the State of Nebraska. Any man[5] interested in dairying is eligible to membership in the club. The Dairy Club is one of the strongest professional clubs of the College of Agriculture . . . " (30, p 21).

Activities of the Club varied over the years. For many years the Club was most widely and favorably known for the dairyland cafeteria conducted annually to help feed the large crowds attending Organized Agriculture Week. Excellent lunches were served, with the high standards of quality and sanitation being maintained in no small part through the efforts of the faculty sponsor, who for many years was L. K. Crowe. Proceeds from the cafeteria were used to support activities of the Club.

In the late fifties the Club started a dairy products booth at the State Fair, which proved to be a very good source of income. The proceeds, as were those earlier from the cafeteria, were used to sponsor various activities of the Club.

In 1924 these activities included ". . . open house for freshmen, held in Machinery Hall; a judging contest . . . held during Organized Agriculture Week; the state high school dairy judging contests held in May each year; an Ag College dance . . .; and a dairy exhibit for the Baby International Stock Show" (21, p 55).

Subsequently, other activities included sponsoring of the dairy judging teams; a spring vacation tour; the Dairy Royal (showmanship contest); an ice cream eating contest; a coed cow milking contest; crowning of the Dairy Royal Princess; and an annual awards banquet (30, p 21; 3; 25).

The Varsity Dairy Club came to an end in 1968 when the dairy department was terminated. The members interested primarily in manufacturing transferred their memberships to the newly formed Food Science Club (Department of Food Science and Technology), while those interested primarily in production became affiliated with the Block and Bridle Club (Department of Animal Science) (3, 25).

The Creamery and Retail Store

Some dairy product processing was carried on by the Department of Dairy Husbandry in the old Dairy Building occupied by the Department from 1896 to 1916. In 1914, the Department installed a buttermilk and lactose dispensary just inside the Dairy Building. "By inserting a penny, one obtains a sanitary drinking cup and then has free access to whatever is in the dispensary. An insulated box has recently been installed in the dairy room in which to keep the ice cream. The cans of cream are kept packed in ice. This is not only a very handy device but keeps the ice cream in very nice shape" (28).

A great improvement took place in 1916 when the Department was moved to the new Dairy Industry Hall (now known as H. C. Filley Hall). The east wing was constructed to house the creamery (dairy processing plant) and a retail store. Facilities were developed for pasteurizing, packaging (bottling), separating and condensing milk; for churning butter; for making cheese; and for manufacturing ice cream (7, 1944-45).

H. P. Davis, chairman of the Department, stated in his annual report for 1941-42 (7): "The college creamery is operated for the primary purpose of providing instructional facilities for students in dairy manufacturing work and for providing facilities for conducting research studies on the manufacture of various dairy products with the purpose of improving present day processes."

E. L. Reichart, who was in charge of the creamery from 1924 to 1942, stated that the volume of business done by the creamery was increased substantially during his tenure in order to provide much needed income for the Dairy Department. At one time the Department operated three wholesale delivery routes[6], one in Lincoln, one west to Grand Island, and one north to Fremont. The products distributed on the routes were principally cottage cheese and butter. Reichart thinks the routes were discontinued about 1950 (26).

Cannell (7) in 1944-45 noted the high quality of products manufactured by the creamery. The following awards were won by the UN Department of Dairy Husbandry in exhibits at the national dairy shows: 1) in 1917, the gold medal for the best milk shown by agricultural colleges; 2) in 1924, silver medal for cottage cheese in the open class, and in 1926, the gold medal in the same class; and 3) also in 1926, the silver medal for Neufchatel cheese in the open class.

In 1944-45 (7) the creamery supplied all of the milk, butter, cheese and ice cream for the University Union, cafeterias, dining rooms, dormitories and cooperative residences, in addition to operating the retail store on campus. During the time that dairy products were in limited supply during WW II, there was no objection voiced on the part of private industry to the University servicing the above outlets. However, as years went

[5]It was a man's world. All 37 members that year were men.

[6]Deliveries were made to grocery stores which provided the retail outlets.

along, wholesale suppliers in Lincoln increasingly voiced objections to a publicly supported institution providing unfair competition to the private sector. (For resolution of this problem, see Part V, Chapter 11, FS&T).

Research

Production (7, 16).

During the period of 1924-1974, the Dairy staff members were involved in a wide range of research projects. Of these projects, a number stand out as research that has had a significant effect, not only on dairying in Nebraska but dairying throughout the U.S. Some of these projects, with modification, have been carried on almost continuously throughout this period.

An example of a long term project was that of the reproductive physiology studies which was started in the early 30's. George W. Trimberger, on the staff from 1934-1944, was the project leader. At that time contagious abortion was a major concern to dairymen across the nation. By the mid 40's the contagious abortion problem was well on its way to solution and the project changed its focus to the study of factors affecting the use of artificial insemination (AI). Two phases of this project that brought national recognition to Nebraska were studies to determine conception rate in dairy cattle by AI at various intervals before and after ovulation; and determine conception rate in dairy cattle by AI at various stages of estrus. These two studies have provided the AI industry with standards of performance that are in use today. In more recent years, this same project directed its attention to techniques for improving breeding efficiency. The project's (in the Animal Science Department) current focus is on estrus detection techniques for use on the farm.

A second example of a long term research project (started in the early 20's) which has had national implications is that of growth in dairy cattle. Project leaders were H. P. Davis and Ray F. Morgan. For some 20 years this project involved photographing and detailing body measurement of large numbers of animals of the four major dairy breeds - Ayrshire, Guernsey, Holstein and Jersey. From this study came information used to develop early growth standards.

Although the idea of once-a-day calf feeding did not originate at Nebraska a significant amount of the early research in this area was done under the leadership of Foster G. Owen. The practice of once-a-day feeding and early weaning (3 weeks) was thoroughly researched at the Panhandle Station and at Lincoln. Once-a-day calf feeding has now become a recommended practice for all Nebraska dairymen.

The first research on feeding complete rations (hay, silage and grain mixed together) was done by Foster G. Owen.

Prior to the time forage analysis was a common practice, the UN dairy research staff (principally I. L. "Jack" Hathaway) was involved in basic research on the vitamin content of various forages. Two studies of significance were the vitamin content of grasses cut at different stages of growth, and the vitamin content of field vs. artificially cured hay.

As early as the late 1930's dairy scientists were studying the nutritive value of grain and forage sorghums for dairy cattle. Studies in the late 50's and early 60's by Foster G. Owen proved that the sterile varieties of sorghum were equal in feed value to the normal (seed producing) varieties.

Mogens Plum conducted research and studies on heritability of different traits in dairy animals. He conducted a study at the Panhandle Station on managing Holstein cows and male offspring for meat and milk production.

Myron G. Rumery was a long time staff member who conducted production research at the North Platte Station.

Research studies on cytogenetics of livestock is a relatively new project for Nebraska researchers but one of great significance to cattle breeders around the world. Franklin E. Eldridge found and reported one of the first, if not the first, dicentric Robertsonian translocations in cattle. He was the first one to find the 1/29 Robertsonian Translocation in Brown Swiss cattle in the United States. Eldridge also published the first textbook on cytogenetics of livestock (18).

Manufacturing and Marketing

Starting about 1922, there appears to have been increasing emphasis placed on manufactured products, particularly on ice cream and butter. During 1922-24, B. I. Masurovsky published a number of papers in trade journals on this general subject.

From about 1925 until his retirement in 1959, P. A. Downs conducted research principally on evaluation and scoring of milk and milk product quality, and on manufacture of cheese. L. K. Crowe, who joined the Department in 1925, conducted research on ice cream manufacture and quality, and on water insoluble acids and their effect on the quality of farm-separated cream and butter made therefrom. D. B. Maxcy, who joined the staff in 1958, conducted a great deal of research on the effects of irradiation on keeping quality. K. M. Shahani conducted research on many subjects but is best known for his work up to 1974 on yogurt and other fermented milk products, and their possible role in the cure or prevention of cancer.

Extension

Production (17).

Over the years, the Extension program has been closely integrated with the industry, much of the work being done through organizations such as the Dairy Herd Improvement Associations (DHIA's). Working

through organizations, along with providing leadership in 4-H Club work, has, in the past and to this day, occupied the major portion of the dairy extension specialists' time.

From the time M. L. Flack was appointed extension dairy specialist in September 1924, there have been extension dairy production specialists on the staff at Lincoln. Other principal dairy production extension specialists have been Martin H. "Mutt" Lawritson, Crawford W. Nibler, Elmer C. Scheidenhelm, and Philip H. Cole. In addition, Don J. Kubik, extension dairy specialist, was stationed in the Northeast District from 1961 to 1984, at which time he was transferred to the East Campus at Lincoln. The position at the Northeast Center was discontinued.

Crawford W. Nibler, extension dairy specialist, discusses different methods of harvesting and conserving forages at a 1960 field day in Dodge County. He is holding a handful of green chop, in this case alfalfa and bromegrass.

One of the innovations in 1924 was that cow testing projects were organized in counties with insufficient numbers of dairy cattle to justify cow testing associations — in such counties the county agents did the work of cow testers. In this same year assistance was being provided to the regular cow testing associations, as well as to bull associations of which there were now six. There were 27 dairy calf clubs, and the specialists held 10 dairy cattle feeding and management meetings.

There was no substantial change in the Extension program until 1927 when the cow testing associations were renamed the DHIA's. A survey was conducted to determine the reasons for poor quality of Nebraska dairy products following which demonstrations were held to attempt to effect an improvement. By 1928 the specialists had become disenchanted with bull associations, stating that most dairy farmers could now afford to have their own good sires.

It was stated in the 1930 report that there were two full time dairy extension specialists. Emphasis continued to be made on the DHIA's and 4-H dairy clubs (the first dairy extension report in which the clubs were referred to as 4-H).

The concern over the low quality of Nebraska dairy products was continued and another survey was made. It was concluded that the low quality could be attributed principally to 1) poor cooling facilities (which could be corrected with cooling tanks); 2) lack of proper sanitation; and 3) holding cream on the farm too long before marketing.

C. W. Nibler (3) stated in reference to the 50 years of 1924-74 that many improvements have been made by dairy producers, and that the Extension staff members have assisted in these changes and improvements. He points to two projects of national and international scope. The first was sponsoring trips to the United Kingdom in 1928 and 1959 for Nebraska 4-H dairy cattle judging teams which had earned the right to represent the United States by winning the national contests. The second project was the production and distribution of a twenty-minute colored film on the use of artificial insemination in dairy cattle. Copies of the film were used in educational meetings conducted by extension specialists in 22 other states.

Manufacturing and Marketing

A major change took place nationally in the dairy industry, starting in the late twenties and continuing to this day when butter consumption per capita started decreasing and cheese consumption increasing. These trends are shown in Table 1.

Table 1. Utilization of milk in the U.S. (5).

	Percentage of total milk production utilized for		*Per capita annual consumption*	
Year	*Making Butter %*	*Making Cheese %*	*Butter (pounds)*	*Cheese (pounds)*
1925	44.4	5.3	18.1	4.7
1935	42.8	6.1	17.6	5.3
1950	28.1	10.1	10.7	7.7
1960	24.9	10.9	7.5	8.3
1970	20.5	16.7	4.4	11.2
1975	17.2	20.7	4.4	14.0

The shift in consumer preference resulted in a major change on farms. Instead of farm-separated cream, producers increasingly marketed fluid milk for cheese manufacturing, with the demise in time of the cream separator on the farm[7]. In this process, the cream stations (which had bought cream from farmer producers) so characteristic of all rural towns, also disappeared. Farmers needed the help of Extension in their production and marketing practices, and plant managers needed assistance in modifying their manufacturing operations.

Recognizing the need for special help as a result of the major shift outlined above, Extension, in 1948, with encouragement and added financial support from the USDA Extension Service, established the position of extension economist in dairy marketing in the Department of Dairy Husbandry. Following two earlier appointees, (Kenneth Johnson and Fred Schultz) T. A. Evans filled the position from April 1956 until February 1968, at which time the Dairy Department was terminated and he joined the newly created Department of Food Science and Technology.

During the 20 year period of 1948-68, the dairy Extension programs dealt with the following major changes in the dairy industry: 1) conversion from the glass bottle to the paper containers for distribution of milk and milk products to the consumer; 2) conversion to Grade A standards for all fluid milk and milk products; 3) change over from collection of milk from the farm in cans to the use of bulk milk tanks for storage and hauling; 4) conversion by dairy farmers from marketing of farm-separated cream to the marketing of whole milk, along with the decline of the butter industry and the increase in cheese production; and 5) the disappearance of the small producers and processors with the resultant change in the methods of distributing milk (25).

The Extension specialists participated in meetings; prepared appropriate circulars, bulletins and news releases; organized and conducted short courses and workshops; and counseled with interested parties concerning possible sites for cheese manufacturing plants.

[7]One of the finest things that ever happened to the farm wife — now she no longer had to wash the cream separator.

Dairy Herd Moved to Mead

The dairy cows were moved from the East Campus to the UN Laboratory at Mead in February 1966 (29). The younger animals had been moved there in the summer of 1965. Thus for the first time since a cow shed was built on the "Farm" in 1875, there were to be no more "milk cows" on the East Campus.

There were a number of reasons for transferring the herd to Mead. With much more land available at Mead, it was possible to provide grazing and winter roughage at a much lower cost than was possible at Lincoln. Some people living near the East Campus were becoming increasingly concerned about the manure smells and flies associated with livestock. In anticipation of the move, the new College of Dentistry Building had been sited south of the dairy complex. Still another reason was that plans were underway to consolidate all UN dairy herds at Mead, to include at a later date herds from the North Platte and Panhandle Stations.

In spite of the logic for making the transfer, there was a degree of sadness associated with losing the dairy cattle from the East Campus. Visiting the dairy

The milking parlor in the last dairy barn on East Campus (built in 1926 and razed in 1971) attracted many visitors, especially city children with their parents or teachers. It also provided employment for students. Shown working here is Delbert A. Merritt, now of Gering, Nebraska. The morning milking crew started work at 2 a.m. and finished about 7.

barn, especially at milking time, had been one of the favorite stops on group tours of the Campus. Thousands of school children had seen the cows being milked and then, in many cases, enjoyed the highlight of the day—ice cream cones at the "dairy store".

Teaching posed much more of a problem than research in having the herd moved from Lincoln. Students in classes requiring work with animals, such as judging, had to do that part of their laboratory assignments at Mead.

In 1967, Frank Baker, chairman of the Animal Science Department, announced that the dairy herds at the North Platte and Panhandle Stations would be moved to the UN Field Laboratory at Mead during the ensuing two or three years (32). When the transfers were completed, the UN was left with only one (consolidated) herd of dairy cattle.

Related Organizations

The dairy industry of Nebraska, both production and manufacturing, has traditionally been rather highly organized. Generally the organizations have been active and effective. Those with which the dairy department staff were associated, often serving as secretaries, and which in other ways cooperated closely with the College of Agriculture have been as follows:

Production Organizations

Nebraska State Dairymen's Association (3). The Nebraska State Dairymen's Association was organized in 1885 and held its first meeting in Fremont December 9-10, 1885. The first president was S. C. Bassett of Gibbon, and the first secretary-treasurer was H. H. Wing, professor of dairy husbandry.

C. W. Nibler states that the Association, through its educational programs and other activities, contributed significantly to the success of the dairy industry in the state. Beginning in 1889 (33), the organization received a modest annual appropriation from the State Legislature, which was discontinued by the 1985 Legislature. The Association was one of the agricultural organizations which for many years held its annual meeting during, and was considered a part of, Organized Agriculture.

During the 102 years of its existence, staff members of the dairy department and more recently members of the dairy section of the animal science department have served as secretaries.

Nebraska Dairy Development Society was organized and held its first meeting February 20, 1924. It was financed by the private sector. Carl R. Gray, president of the Union Pacific Railroad, was the first president of the organization, and H. P. Davis, chairman of the Dairy Department, served as the first secretary-treasurer. The Society operated with headquarters in and almost as an integral part of the Dairy Department of the University. Otto H. Liebers and M. (Mutt) N. Lawritson, both former UN staff members, were employed as manager and assistant manager, respectively.

In 1926, President Gray stated: ". . . the Nebraska Dairy Development Society is to be devoted to the best interest of the farmer in this State, to encouraging and aiding him in any present dairy activities, and to the development of the business as a whole along constructive and practical lines, having in mind continually that to be successful it must be profitable."

The Society set up a five year educational program with emphasis on: statistics and information, cow testing, feeding and management, sires, club calf work, and marketing.

The advantage of having the president of a major railroad as the prime mover of the Society became very evident. In 1925 the Union Pacific Railroad provided a special educational train which was known as the "calf club special". It was stated that all the modern conveniences possible were put on the train. Two cars were devoted to exhibits furnished by the College of Agriculture. The train started its run with 22 purebred dairy bull calves donated by Nebraska breeders. There were 22 educational stops made, one half day in length each. At every stop one of the purebred bull calves was exchanged for a "scrub" (1, 2).

For some years the Society continued to carry on a successful program, one which contributed significantly to the dairy industry of the State. However, it was terminated in the early '30s, a casualty of the Great Depression.

Dairy Breed Associations. There are associations in Nebraska for each of the following cattle breeds: Ayrshire, Brown Swiss, Guernsey, Holstein-Friesian, Jerseys, and Milking Shorthorns. Over the years there has been a close relationship between these associations and the Dairy Department. Staff members have regularly attended the association annual meetings, often appearing as speakers, and at various times serving as secretaries. It has been a synergistic relationship.

Nebraska Inter-Breed Dairy Council, organized March 11, 1949, was sponsored by the Nebraska State Dairymen's Association and the National Purebred Dairy Cattle Association. Membership consists of the six individual breed associations mentioned above. The purpose of the Council is to encourage unity of purpose and practices among members, and to conduct projects of mutual benefit to all breeders of purebred dairy cattle. The first president was Otto H. Liebers, with C. W. Nibler of the Dairy Department serving as secretary from the beginning until November 1983.

Artificial Breeding Associations and Bull Studs. Prior to the utilization of artificial insemination, there were a number of cooperative bull associations in the state. The first of these was started in Saunders County in 1922. By 1939 there were 11 such associations, owning 51 bulls used cooperatively to breed 1,350 cows (11).

The Dairy Department was much involved in ar-

tificial insemination, from a research and educational standpoint, and early on in producing and marketing semen. Basic research conducted by Andrew B. Schultze, over a period of years, contributed to the application of breeding dairy females artificially to plus-evaluated sires. This practice has extended higher milk transmitting traits to a larger population than would have been possible if bred naturally. In the 1940's, Schultze also assisted in establishing semen producing businesses and training A. I. technicians.

The first artificial breeding cooperative west of the Mississippi River was started in Douglas County in April 1941. Up to 1950, four "bull studs", as the associatons came to be known, operated as separate entities. In addition to Douglas County these included units at the University, Lincoln, Grand Island and Norfolk. For the most part, each "stud" provided semen of different breeds. The four units organized themselves into the State Federation of Artificial Breeding Associations, and finally, in 1952, they combined to form the Nebraska Non-Stock Dairy Breeders Cooperative (later the Nebraska Dairy Breeders' Association) with headquarters at Fremont. This association, in turn, merged with the Midwest Breeders Association at Anoka, Minnesota, and still later the Minnesota Association merged with 21st Century Genetics at Shawana, Wisconsin (3).

Dairy Herd Improvement Associations (DHIA's) (3, 6, 12). The extension dairymen have, from the beginning, provided a great deal of assistance to the DHIA's.

The DHIA's, known initially as cow testing associations, had their beginning in Nebraska in 1910, with the first association being organized in Douglas County. The purpose of the association is to provide information of each individual cow to help guide the DHIA member in his feeding, breeding, and management practices.

Each association has a supervisor, known in the earlier days as "cow testers". These persons visit each member's farm on a monthly basis, at which time complete records are obtained on feed consumed and amount of milk produced in a 24-hour period. Samples of milk, obtained at the time of the visit, are sent to a central laboratory for determination, with modern electronic equipment, of percentage of butterfat and in some cases also of protein. All of the information is then submitted to a district computing center where it is analyzed, and the information sent back to each farmer/member. Also information from DHIA's all over the United States is sent to USDA, Washington, D. C. for the purpose of sire evaluation.

Various prominent alumni of the College of Agriculture have served in the capacity of cow testers (supervisors), including Addison H. Maunder, C. W. Nibler and Fred E. Siefer. Siefer (13), class of 1932, recalls his experience as a cow tester as follows: "Elmer Scheidenhelm, UN dairy extension specialist, feeling sorry for me in not being able to get a job, started me on my career as a cow tester, with headquarters at Kearney. I needed $5.00 to buy gas for my model A Ford to get to Kearney. H. K. Douthit, supervisor of the Farm Operator's Course, took pity on me and advanced the money. In doing the testing, I furnished the car, paid for the gas, roomed and boarded with farmers free of charge, and if I collected all that was due, earned $50.00 per month.

"At Frank J. Haumont's[8] I had to sleep in the hay house in the same bed with the hired man who took one bath per year. However, there was also the bright side — every morning for breakfast at the Haumonts we had waffles with honey and whipped cream.

"When a piston broke in the Model A, I bought a used one for 50 cents and installed it myself. When I advanced to the position of county agent, some months later, I had saved enough money as a cow tester to buy a new suit of clothes."

Since Siefer's time, the position of supervisor has become much more professional. No longer does the person sleep and eat at the farms, he (she) drives to a member's farm, does the work, and returns home each evening.

The Nebraska DHIA's have been organized into the Nebraska Dairy Herd Improvement Association which has gradually assumed more and more of the coordinating role of the individual associations.

Progress made by the DHIA's over the years from 1948-49 to 1974-75 is shown in Table 2.

Table 2. Number and performance of cows in DHIA's in Nebraska

Year	*Total No. cows in DHIA's*	*Annual Production per cow (in pounds)*		*Annual income per cow above feed costs*
		Milk	*Butterfat*	
1948-49	3,976	8,859	341	$219
1958-59	10,440	9,879	380	257
1968-69	17,437	11,878	446	358
1974-75	22,785	12,252	459	392

The Cooper Foundation[9] (3, 4)

The Foundation, established in Lincoln, Nebraska in 1934 by the late Joseph Cooper, provided substantial support over the years to the Dairy Department. Mr. Cooper, a wealthy businessman who lived in New York City, owned a chain of motion picture theaters, including the Cooper theaters in Lincoln. He had a dairy farm at Verbank, New York, and through assistance provided to him by H. P. Davis in purchasing Holstein cattle from the excellent Dunloggin and Winterthur herds, and through other contacts in Lincoln, Cooper became interested in helping the UN establish a really fine Holstein herd.

To carry out Cooper's wishes, the Cooper

[8]Prominent farm leader at Broken Bow who in 1967 was named "Honoree" in the Nebraska Hall of Agriculture Achievement.

[9]Elwood N. "Jack" Thompson has served as president since January 1, 1964.

Foundation, with headquarters in Lincoln, gave the UN Foundation $100,000 for purchase of cattle at the Cooper farm dispersal sale. Following Cooper's death in 1946, M. L. Baker, H. P. Davis, and M. N. Lawritson (extension dairyman), representing the University at the sale, paid a total of $85,550 for two Holstein males and 23 females.

By July 1, 1947, following the above sale, earlier gifts from Cooper, and the offspring thereof, the "Cooper" cattle in the University herd consisted of 6 male and 16 female Guernseys, and 23 male and 38 female Holsteins.

The potential inherited traits for high milk production of the "Cooper" cattle were distributed to many Nebraska dairy herds, largely through semen for AI, marketed by the UN to Nebraska Artificial Breeding Cooperatives.

After the Cooper dispersal sale, Chris Sanders, a UN College of Agriculture graduate, who had been Cooper's farm manager, was employed by the Cooper Foundation, with headquarters in the University Dairy Department, to help build and improve the dairy production industry in Nebraska. Sanders carried on his work virtually as another extension dairyman.

Among other projects, Sanders, with the assistance of others in the Dairy Department, conducted annually the spring calf sale where 60 to 70 purebred dairy calves, purchased in Minnesota, were sold exclusively for 4-H dairy projects in Nebraska. The calves were sold at auction, and after the sale the Cooper Foundation refunded to each purchaser the difference in the price he (she) had paid and the actual cost of the calf at the Minnesota farm, the Foundation absorbing all costs of acquiring the calves, including trucking to Lincoln.

In 1947, Sanders, with financial support from the Cooper Foundation, helped start the District Dairy Shows, which are continued to this day.

Sanders died September 4, 1959. Although the Foundation continued to provide financial support for various dairy projects after that time, Sanders' position was never filled.

Manufacturing Organizations (7, 25)

Those no longer in existence:

1) Nebraska Butter Institute - The Institute was organized by the butter industry, including cooperative creameries, centralizers and independents, to improve the quality of the state's butter output. The methods used were both educational and regulatory. At various times both Downs and Crowe of the Dairy Department staff served as executive secretaries of the organization.

2) Nebraska Cooperative Creameries Association - This association was a trade association organized by the cooperative creameries. The principal objective was to influence legislation. Another objective was to improve the quality of farm-separated cream.

3) Milk and Ice Cream Dealers Association - This was a proprietary trade association of milk and ice cream companies, the purpose of which was to influence legislation of primary interest to the group. The organization also attempted to improve the quality of their products through education and regulatory means.

4) Nebraska Dairy Technology Society - The principal function of this group was to promote a close relationship between commercial organizations and the staff members of the colleges and universities dealing with principles and practices of dairy manufacturers. A member of the University Dairy Department usually served as secretary of the organization.

5) Grade A Steering Committee - This committee was organized at the time the adoption of standards for the production, processing and distribution of milk were being promoted by the dairy industry and by consumers through public health agencies. The organization was also active during the transition from can delivery to bulk delivery of fluid milk from the farm. Members of the UN Dairy Department staff, along with representatives from regulatory agencies, dairy producers, processors and milk distributors served as members of the Committee. This was a temporary committee.

Organizations active in 1987:

1) Nebraska Dairy Industries Association - This is a trade association that over the years absorbed the Butter Institute, the Nebraska Cooperative Creameries Association, the Milk and Ice Cream Dealers Association, and the milk producer cooperatives. The purpose of the organization is to work for the betterment of the industry, including influencing of legislation.

2) American Dairy Association of Nebraska - The association is a promotional organization. Its objectives are to increase the consumption of milk and milk products, and to encourage research projects at the University on the value of milk as a food. Initially, the headquarters offices were located in the Department of Dairy Science.

3) Dairy Council - Another promotional organization supported by the dairy processors to increase the consumption of milk and milk products. For the most part the staff has been composed of home economists working primarily with doctors, dentists, dieticians and educators.

International Programs

Turkey (19)

L. K. Crowe served on the University of Nebraska staff in Turkey from October 15, 1958 through December 31, 1960, first as associate chief advisor, and then from August 1, 1959 until the completion of his tour of duty, as chief advisor. Under his supervision, a modern dairy processing plant was built, equipped

and activated at the new Ataturk University at Erzurum.

Colombia (20)

The USAID had built and equipped a dairy processing plant at the College of Agriculture at Medellin, Colombia, which in 1967 for the lack of some critical equipment and qualified operators, was not functional. In connection with the UNL program in Colombia, L. K. Crowe made a number of short-term trips to Medellin to help determine and procure, along with other Nebraska staff members, needed equipment and instruct personnel in operation — the plant did become functional. He also assisted plant managers in neighboring plants in improving operational methods, and outlined courses of instruction for students in dairy technology. (See also Part II, Chapter 11).

High Individual Honors

Staff

Recipient of UNL Distinghished Teaching Award

Lawrence K. Crowe 1965

Recipient of the Honor Society of Agriculture-Gamma Sigma Delta Distinguished Service to Agriculture Award

Khem M. Shahani 1957

Alumni

First premier of Latvia when the country was established as an independent Republic on November 18, 1918

Kalis August Ulmanis (34, 35, 36)

Member of the Nebraska State Legislature

Otto H. Liebers 1951-1959

End of the Department[10]

On January 30, 1968, the Department was officially terminated. It had been a very good Department, with strong support from the industry, but finally time had passed it by.

The fact that the Department encompassed the entire industry from farm production through manufacturing and distribution, was both its strength and its weakness. For many years no department in the College of Agriculture enjoyed greater strength in an integration of production and processing than the Dairy Department. In the earlier days, production, processing, and even retailing were commonly present in various combinations within the same firm. For example, at Lincoln the Woodlawn and Skyline firms were in the dairy business all the way from producing milk on farms to retailing dairy products from dairy trucks to the consumer's doorstep.

But the dairy business changed. Gradually production and processing were almost completely separated. Over the years the dairy processing firms shifted to becoming large and diversified food processing firms. Much of the retailing came to be handled by still other firms, especially the supermarkets and more recently the convenience stores. Some of the large dairymen's cooperatives have purchased and are operating dairy processing plants, done primarily to keep financially troubled corporations operative.

The University, in order to be able to properly serve the food processing industry, was called upon to establish a Department of Food Science and Technology. When this was done, in 1968, the logical step was to incorporate dairy manufacturing into the new Department. The principles of breeding, nutrition, physiology, and management for dairy cattle and beef cattle grew to be more and more alike, so there came to be a good deal of logic for combining the two into one department. Accordingly, in 1967, the production segment of the former Department of Dairy Science was shifted to the Department of Animal Science. There remain, of course, problems unique to dairy production, hence a section of dairying is maintained in the Department of Animal Science.

[10]July 1, 1967, production staff transferred to Department of Animal Science; December 11, 1967, Department of Food Science & Technology approved by Board of Regents, and activated February 1, 1968.

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Chapter 10. Entomology[1]

Contents

Names of Department (1)

Department of Entomology	1887-1895	Department of Entomology	1906-Present
Dept. of Entomology and Ornithology	1895-1906		

Administrators (2)

Name	Title	Years Served
Lawrence Bruner	Head Professor	1895-1919
Myron H. Swenk	Chairman	1919-1941
H. Douglas Tate	Chairman	1941-1946
Ephriam Hixson	Chairman	1946-1950
Roscoe E. Hill	Chairman	1950-1966
Earle S. Raun	Chairman	1966-1970
E. A. Dickason	Chairman	1970-1977
E. A. Dickason	Head	1977-1984
Roger E. Gold	Head	1985 - Present

[1]The authors gratefully acknowledge the assistance of Roscoe E. Hill for conducting research, providing material and writing portions of this chapter.

Headquarters Locations (3, p 5, 4)

University Hall	Prior to 1889
Nebraska Hall	1889-1898
Mechanic Arts Hall	1898-1906
Nebraska Hall	1906
(Economic work moved to Experiment Station Hall in 1906. Sometime before 1911, all of Entomology had moved to Experiment Station Hall)	
Plant Industry Hall	1913-present

The Early Years

Organized work in entomology at the University dates from the beginning of the Nebraska Agricultural Experiment Station in 1887. However, from 1871 to 1883 Samuel Aughey, Professor of Agricultural Chemistry and Natural Sciences, was obliged to give some attention to the more troublesome insects, especially grasshoppers. He contributed several articles on insects to the newspapers, the *Nebraska Farmer* and to the annual reports of the Nebraska State Horticultural Society.

In his 1881 Charter Day address, in recounting the earliest days of the University of Nebraska, Aughey said, ". . . difficulties unexpected and unforeseen arose that naturally interfered with the attendance of students. Among these obstacles . . . were the locust raids of 1872, '73, and '74. Owing to these raids, the agricultural classes, which constitute the majority of people, were financially straitened and were unable to send their children to school away from home . . ." (19).

Entomology in 1872-73 Catalog

Obviously, insects had an impact on the early history of the University and it is not surprising that entomology was listed as a subject for study in the 1872-73 catalog, but few students took the courses until about 1885-86. Nor is it strange that Aughey was moved to write, "My special studies have been so largely devoted to geology and botany that I could not give entomology the attention which the importance of the subject . . . demands" (20).

Among Charles E. Bessey's recommended programs for the newly established Experiment Station was a project relating to entomology which he introduced as follows: "The injurious insects of the farm, orchard, and garden demand attention at our hands. Very naturally the people of the state look to this institution for information and suggestions, and we ought to be in a position to render the aid asked . . . at the least, some provision for the collection and study of the injurious insects of the state . . . Few things would help the standing of the University more among the people of the state than work of this kind" (21).

Conway McMillan (actually a botanist) was appointed station entomologist in 1887. He stayed but a short time, wrote a bulletin on "Twenty-two Common Insects of Nebraska" (22), and resigned to become instructor in botany at the University of Minnesota. He was succeeded by Lawrence Bruner in April 1888. Bruner was a recognized entomologist, a former student of the University of Nebraska and a man with several years of entomological experience with the U.S. Department of Agriculture[2].

Aside from his teaching and training of other entomologists, Bruner authored a number of papers on Orthoptera. A. E. Sheldon, a Nebraska historian, called Bruner "the state's first great naturalist. Whatever successors may come in that field, his position is secure for all time" (31).

Bruner handled the entire work in entomology with some help from the entomology students (23). Some of these students were given "assistant" status including Herbert Marsland, Harry G. Barber, Walter D. Hunter, Myron H. Swenk, Ralph W. Dawson and Harry S. Smith (24). Several of the early students went on to become prominent entomologists.

During Myron H. Swenk's tenure at the University (1907-1941), Nebraska suffered serious Hessian fly and chinch bug infestations and an unusually destructive grasshopper outbreak lasting several years. Swenk gave these problems his close attention. His efforts toward securing and the efficient use of federal aid was important to the economic well being of the state and its farmers.

Much time was spent making collections of insects in the field, building up the reference collections, assembling a library, answering correspondence, and speaking before various organizations including frequent participation before the Farmers' Institutes throughout the state (25).

From 1888 through 1903 a series of reports and bulletins was issued dealing with insects of ornamental and shade trees, small grains, corn, apples, grapes, clover, alfalfa, sugar beets, grasses, and livestock. These contained much of what then was known of the life histories, habits and remedies for control of the insects which were or might become important to Nebraska's developing agriculture.

First Work Was Taxonomic

Many of the control remedies and accounts of life histories were borrowed from workers in other states. Since a considerable part of the local work during this early period was taxonomic, it was referred to as the "descriptive and compilatory phase of entomology in Nebraska" (26).

From 1916 to 1920 entomological research became more experimental and was aimed at obtaining new

[2]Although Bruner attended the University, he did not complete the academic program. However, as a member of the University faculty in 1897 and while on leave in the Argentine Republic, Bruner was awarded an honorary bachelor of science degree for distinguished service in the field of entomology (27). This is believed to be the only honorary bachelor's degree ever awarded by the University of Nebraska.

information on life histories and the improvement of control measures. These studies were directed, for the most part, at the most troublesome insects: the grasshoppers, chinch bugs, the Hessian fly and various cutworms and wireworms. Rodents, such as prairie dogs and pocket gophers, also received attention during this time.

In 1924 there were four staff members in Entomology: Myron H. Swenk, chairman; Don B. Whelan, Raymond Roberts and Everett E. Wehr. Also, Lawrence Bruner was listed on the academic staff until 1931 when he retired as Professor of Entomology Emeritus; however, he had been living in California for some time before that.

Teaching

In 1895 the Regents established the Department of Entomology and Ornithology with Lawrence Bruner as its head professor. Courses offered were preliminary (or general) entomology, economic entomology, systematic entomology, and horticultural and domestic entomology. From time to time these basic courses were updated. As the teaching staff changed and grew and the Department's research program expanded, new courses were added until about 1970 when 16 courses were offered. New courses included acarology, insect control by host-plant resistance, and pesticide dissipation in soils and plants. The most recent additions have been entomological techniques, insect pest management, and pest management models.

In January 1960, due to lack of students, the entomology staff decided they would teach no undergraduate economic entomology courses unless they were given some assurance that other disciplines wanted entomology as a part of their required curriculums (11).

The Advanced Degree Programs

In 1886 Conway G. McMillan obtained a master's degree with a major in geology and entomology. This was the first master's degree granted by the University of Nebraska (32).

During Roscoe Hill's tenure as chairman, a PhD program was approved for the Department of Entomology (1958). The first doctorate degree with a major in entomology was granted in 1961 to Morgan C. Webb. By 1984, 46 PhD degrees had been awarded. Ninety-six master's degrees in entomology were awarded between 1928 and 1984 (6, R. E. Hill dedication page, and 7).

Student Clubs

From time to time there had been an entomology club, once with the Greek name Theta Epsilon (1947-48), but interest lagged and the clubs disappeared. In late September 1965, several graduate students began discussing the possibility of forming an entomology club to provide social functions and hold meetings for the purpose of scholarly endeavor. In October the Bruner Entomology Club was organized (14). This Club has been active and has carried on many worthwhile projects such as sponsoring the entomology department newsletter and departmental social functions. One project was the preparation and selling of insect identification packets (including samples of economic species) to county extension agents and vocational agriculture teachers in Nebraska (8).

Research

Persons appointed to the research/teaching staff after 1924 and not later than 1974, and who were with the Department for at least 10 years are Elvis A. Dickason, Arthur J. Hagen (Panhandle Station), Thomas Helms, Roscoe E. Hill, Calvin M. Jones, LeRoy L. Peters (South Central Station), S. Dean Kindler, George R. Manglitz, Z. B. Mayo, Kenneth P. Pruess, Robert Staples, and Clifford J. Walstrom.

During the decade 1951-1961, research facilities for the entomology staff increased significantly. An insectary-greenhouse was completed in 1953 and a USDA forage insect laboratory in 1958.

Following are some examples of entomology research pertaining to production agriculture:

Hessian Fly (Determinaton of fly-safe dates for planting winter wheat)

Observations during 1923-1925 and 1930-1933 of fly emergence and behavior of the fall brood of Hessian flies resulted in information which has been helpful to wheat growers.

Experiments with Baits for Grasshoppers

From 1923 to 1927 experiments were made with base materials, dosages of arsenicals, attractants, moisture, and application procedures. The research information was used extensively during the grasshopper outbreaks of the 1930's. Further bait experiments were conducted in 1937, 1938 and 1939.

Potato Insect Control in Western Nebraska

The potato insects project, conducted from 1940 to 1960, probably received the Department's most intensive study during 1940-1946. Significant advances were made toward understanding and controlling the tuber flea beetle and potato psyllid, species which affect quality and yields.

It was also determined that tuber injury by flea beetles can be markedly reduced in western Nebraska by eliminating early plantings of potatoes, destroying cull dumps, and combining late planting with early, frequent and thorough insecticide applications. DDT was found to be far superior to arsenicals, the fluosilicates and sulfur, and was effective in controlling almost all insects affecting potatoes. Later other insecticides applied to the soil ahead of planting practically eliminated tuber injury.

Mosquito Survey

During 1942 and 1943 a statewide light trap study showed flood water type mosquitoes regularly reach high population levels in irrigated regions, often interfering with agricultural operations. These mosquitoes breed in drainage and seepage water.

Culex tarsalis, a dominant species, has been repeatedly shown by other workers to be infected under natural conditions with the virus of St. Louis and western equine encephalitis and is capable of transmitting the infection. Thirty-three species of mosquitoes were listed in the studies.

Wheat Streak Mosaic

The virus causing wheat streak mosaic, a serious disease of wheat, is transmitted by an eriophyid mite. In 1954 the Kimball County winter wheat crop was almost a total loss because of the disease. An extensive epidemiological study conducted in 1953 and 1954 found that wheat streak mosaic may be mitigated in western Nebraska by late planting and the elimination of volunteer wheat appearing shortly before or after harvest.

Serious losses again occurred in western Nebraska from an epidemic of this disease in 1964. This led to an experimental reappraisal of the problem. The latter evaluation resulted in a much better understanding of the epidemiology of this important mite-transmitted disease.

Corn Rootworm Resistance

A most important event—"a corn rootworm population explosion"— occurred in the early 1960's. There were extensive losses over much of the corn growing area of the state. In 1961, especially, news stories and headlines in Nebraska papers and journals recounted the seriousness of the outbreak. The primary contributing cause was the development of resistance by the western corn rootworm to soil-applied chlorinated hydrocarbon insecticides which were being used for their control.

The Department of Entomology immediately undertook a "crash" program involving research and extension personnel. Through the active concern and interest of certain state senators, Governor Frank B. Morrison and College of Agriculture administrators, a USDA-ARS grant was obtained to aid the research efforts.

Of first importance was a search for alternative effective chemical insecticides which could replace the ineffective materials. Secondly, tests were conducted to determine if the rootworms were actually resistant and, if so, to define the extent of the resistance. Thirdly, longtime studies of the rootworm biology and ecology were renewed.

The new insecticides (organophosphates) were proven effective and their use was widely adopted by farmers. Except in the far west, insecticidal resistance was shown to be a statewide problem and the basic cause of the rootworm problem. The rootworm project continued to receive major attention throughout the 1960-74 period.

Extension

Before passage of the Smith-Lever Act of 1914, extension type work in entomology was handled by Lawrence Bruner and Myron H. Swenk. The first extension specialist in entomology was Clarence E. Mickel, appointed October 1, 1917. Mickel devoted a major portion of his time to the control of pocket gophers, demonstrating the proper methods of poisoning and trapping. He also worked out an insect pest control program which promised to develop into a sound ongoing entomology activity. However, in the financial retreat following World War I, the position was discontinued June 30, 1920.

Orlando S. Bare, known to close associates as "Dan", was appointed extension specialist in entomology in 1929 and served in that position until 1939. Probably the extensive grasshopper infestations were the predominant factor in arousing and maintaining interest in extension entomology work. By 1938 grasshopper control was carried on in every county with about 75,000 farmers participating in the campaign (10, pp 2 & 3). The worst grasshopper infestation since pioneer days occurred in 1936 and 1937 (2, p 6).

Bare was an authority on bees and to many students and campus visitors, he was best known for his knowledge of this subject (2, p 12).

Since Bare's appointment in 1929, Nebraska has had a bona fide extension program in entomology. Bare effectively handled extension full time until 1939 when he was assigned to the teaching and experiment station staffs. He continued, however, to do some extension work and handled much of the heavy correspondence during the next several years.

From 1940 to 1952 six others served Nebraska as extension specialists in entomology: Don B. Whelan (1940-1944); Martin H. Muma (1945-1948); Clarence A. Sooter (1946-1948); Jack W. Lomax (1948-1951); Clifford J. Walstrom (1949-1950) and Robert W. Helm (1950-1952). Harold Hauke, USDA (1942-1954) assisted in control activities.

During the period 1940-52, the grasshopper control campaigns were continued. The state was finally invaded by the European corn borer in 1944, and in 1949 Nebraska suffered a serious corn loss from this new pest.

New organic insecticides appeared, including DDT, BHC, chlordane, toxaphene, aldrin, and dieldrin. Extension demonstrations and experiment station research with DDT and BHC gave promising results; yields of potatoes increased significantly with use of DDT sprays. Hog mange was controlled with BHC sprays. Biting flies and house flies were also reduced in number by spraying barns and feedlots. Soil treated

with BHC ahead of planting was shown to be an effective control for corn rootworms.

In 1952 Robert E. Roselle was appointed extension specialist in entomology. Roselle directed the entomology extension work efficiently, effectively and continuously until he retired in 1983—tenure of 31 years. When he arrived in 1952, the first wave of the new organic insecticides had been tested in the state for several years and farmers, ranchers and livestock feeders were beginning to use them in their production operations.

Roselle was a long-time panel member of the television program "Backyard Farmer." He was succeeded as extension entomologist by David L. Keith, who had been on the staff since 1967.

New chemicals continued to appear. The pesticide industry made tremendous growth and, with the proliferation of new chemicals, conditions arose which greatly altered the work of the extension entomologist. The new insecticides were promising but their use and mere presence generated a number of serious problems—potential hazards to human health and to the environment. Consequently extension entomologists have faced the difficult task of developing and keeping current legal recommendations for control of important pests.

Crop protection meetings are held in several localities each year and county agent in-service training meetings are now regularly conducted to get information to farmers and ranchers. With the recent "usage classification" of insecticides as "restricted" or "nonrestricted" it is now necessary for a person wishing to buy or use "restricted" materials to be certified. The extension entomologists have been involved in the preparation of training materials and meetings to train others who can conduct certification clinics for persons wishing to become certified.

International Programs

One of the University's earliest participants in international assistance was Lawrence Bruner who, in 1897 and 1898, spent several months in the Argentine Republic investigating a severe migratory locust (grasshopper) outbreak and advising the government regarding control methods.

Getting to a foreign country 90 years ago was much more difficult than it is today. Bruner left Lincoln on April 17, steamed out of New York on a combination passenger/freighter ship on April 27, and arrived in Buenos Aires, Argentina on June 1 (28).

E. A. Dickason was appointed director of the College of Agriculture International Programs in 1973 and served until 1975. Dickason and Robert W. Kleis conducted and published a survey of the work done earlier by the Nebraska Mission in Colombia[3].

[3]For a summary of their findings see Part II, Chapter 5, Section 2 "The Nebraska Mission in Colombia".

Entomology Museum

The University of Nebraska State Museum was established by the Board of Regents in 1871. Entomology was made a Division of the Museum in 1948, providing for a quarter-time curator to care for the entomology collections (2, p 9). The Division remained with the Entomology Department in the Plant Industry Building until 1969, when it was moved into new quarters in Nebraska Hall on the City Campus (6, 15). The entomology collections are now housed with those of botany, zoology, parasitology, anthropology, and vertebrate and invertebrate paleontology in the Museum's Systematics Biological Research Collections facility.

The entomology collections number about 1.75 million specimens and are studied by students and specialists from around the world. The holdings in the Division of Entomology represent one of the two major insect collections for the Great Plains, and the systematics collections of the Museum are one of the 31 major national systematics collections in the United States and an essential resource in systematics biology (6).

Today's entomology collection had its beginning in the private collection which Lawrence Bruner began to amass during the 1870's. Next to Bruner, Myron Swenk probably contributed the most to the growth of the collection (30).

Cooperation with Governmental Organizations

Nebraska Wheat Commission

Pale western cutworm (*Agrotis orthogonial*) caused serious losses for wheat growers in southwestern Nebraska and the southern Panhandle during 1955 and 1956. Kenneth P. Pruess was hired in 1957 on a grant from the Nebraska Wheat Commission to do research on this insect and was stationed at North Platte. However, the spring of 1957 was exceptionally wet and most of the insects died of diseases. Fortunately, the project was written to cover cutworms in general, so Pruess continued doing research, this time on the army cutworm. Although of little economic importance in wheat, army cutworm is often abundant in that crop and many unneeded chemicals are applied. After Wheat Commission funds expired, Pruess obtained a National Science Foundation grant to continue work on migration of this insect (16)

USDA - Agricultural Research Service

From the mid-1950's the entomology research program has been materially strengthened by the assignment to Nebraska of USDA-ARS personnel from two sections of the Entomology Research Division—Cereal and Forage Insects (1954) and Insects Affecting Man and Animals (1956).

Both ARS projects were pursued actively and productively. The Nebraska program benefits not only in

research but also academically. The federal laboratories provide funds for graduate assistants and some of the federally employed entomologists teach classes, direct graduate thesis work, and serve on committees for various graduate students. It has been a "happy association."

From 1972 until 1978 there was no ARS livestock program conducted from the Department at Lincoln. In 1978, a USDA-ARS livestock research unit was again established with the Department of Entomology at Lincoln.

There are now four federal entomologists working in the Department of Entomology in cooperative research programs which involve studies of legume insects and certain livestock pests.

Support from Charitable Foundations

Upon the death of Myron H. Swenk, his sister, Miss Iva B. Swenk, left approximately $12,000 to the University of Nebraska Foundation and specified that earnings from the funds be used in the Department of Entomology. A format was developed in which scholarship grants-in-aid were to be awarded to undergraduate or graduate students in entomology for attendance at scientific meetings or to meet expenses (supplies, publication costs) associated with research studies. From 1970 (when the memorial fund was established) to 1976, 35 awards had been made to students in entomology for a total of $3,336.20 (6).

Related Organizations

Nebraska Honey Producers Association

The Honey Producers Association (also called the Nebraska Beekeepers Association in the early days) held annual meetings on the College campus as part of Organized Agriculture. The meetings were educational and also promoted the beekeeping industry. Orlando S. Bare dismissed classes for those two days so his students could attend the meetings.

After Organized Agriculture was terminated with the 1949 sessions, the Honey Producers Association held meetings independently on the campus until about 1965. Subsequently the meetings were rotated around the state.

From late 1926 to 1942, there was an extension apiarist. Later, because of budget cutbacks, the apiarian work was transferred to the extension entomologist. Apiarists included Bare, Don B. Whelan, and Clifford J. Walstrom who also served as state apiarist from 1950 to 1973. Walstrom was also state entomologist (18).

Other Associations

College entomologists work closely with the Nebraska Pest Control Operators Association, the Nebraska Aviation Trades Association, and the Nebraska Independent Crop Consultants Association. The latter had its roots in a series of pest control workshops given by the Departments of Entomology, Plant Pathology and Agronomy (Weed Science) (17, 29).

Major Honors and Recognition

Staff

Recipient of USDA Superior Service Award

Robert E. Roselle	1964

Alumni

Recipients of honorary doctorate degrees from the University of Nebraska

Cornelius B. Philip	1951 (9).
Harry S. Smith	1953 (13).

President of the Entomological Society of America

Robert H. Nelson	1970-1971.

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Chapter 11. Food Science and Technology[1]

Contents

Name of Department (1)

Department of Food Science and Technology 2/1/68-present

Administrators

Name	Title	Period Served
T. E. Hartung	Chairman	1968-1973
Thomas Allen Evans	Acting Chairman	1973
Roy G. Arnold	Chairman	1973-1977
Roy G. Arnold	Head	1977-1979
Lloyd B. Bullerman	Acting Head	1980-1981
A. Larry Branen	Head	1981-1982
Lowell D. Satterlee	Acting Head	1983
Lowell D. Satterlee	Head	1983-3/21/86
Charles E. Walker	Interim Head	4/1/86-12/31/86
Glenn W. Froning	Interim Head	1/1/87-6/30/87
Stephen L. Taylor	Head	7/1/87-present

Locations on East Campus

The Department Proper

Dairy Industry Hall - basement and first floor (renamed H. C. Filley Hall in 1972), 1968-present.

- also -

College Activities Building - research laboratory, 1981-present.

Natural Resources Hall - cereal technology laboratory, 1980.

Facilities in Related Departments

Loeffel Meat Laboratory - meat slaughter and processing facility and laboratory, 1953-present.

Mussehl Hall (formerly Poultry Science Hall) - facilities for processing of poultry products, 1968-1984.

Kiesselbach Crops Research Laboratory (formerly Crops Laboratory), 1959-1979.

Plant Science Hall - wheat quality laboratory, 1979-present.

L. W. Chase Hall (formerly Agricultural Engineering Bldg.) - food engineering research laboratory, 1968-present.

Ruth Leverton Hall - food service facilities, 1968-1984.

Miller Hall - statistics, 1980-present.

Establishment of the Department

The Department of Food Science and Technology had its genesis in a number of College of Agriculture departments, its most important progenitor having been the Department of Dairy Science. Up to 1960, food processing was incorporated in the Departments

[1]The authors gratefully acknowledge the assistance of these staff members of the Department of FS&T with this chapter: Lloyd B. Bullerman; Thomas A. "Al" Evans, professor emeritus; and staff secretary Grace M. Sobotka.

of Dairy Science, Agronomy, Animal Science, Poultry Science, and Agricultural Engineering in Agriculture; and in Foods and Nutrition in Home Economics. The food processing industry itself had been segmented along similar lines—thus there were grist mills, canneries, poultry processing plants, packing houses for red meats, and creameries. As the years went along there was more and more of an integration into food processing and preservation industries.

Earlier, both in industry and in the College of Agriculture, the closest integration of production and processing existed in dairying. The College of Agriculture had an excellent, well balanced Department servicing production, processing, preservation, and marketing of dairy products. That production was growing further and further apart from the rest of the industry was apparent. In 1960, on recommendation of the College of Agriculture staff and administration, the Board of Regents approved establishment of a new major for students in the College of Agriculture, entitled "Food Technology". The move was strongly supported by the Ak-Sar-Ben section of the Institute of Food Technologists (IFT). This was an inter-departmental major, involving all Departments with food processing interests (3).

On May 2, 1966, a College of Agriculture committee appointed by Dean Frolik and chaired by Clyde C. Noyes, recommended to the Dean's Advisory Council that the College of Agriculture establish a program which would help make it possible for Nebraska's food industry to gain its full potential by taking raw materials through the steps of preparing them for the consumer in the nation's large urban centers. The 40 member Council, composed of lay people, approved the recommendation (7).

On October 25, 1967, the staff and administrators of the College of Agriculture submitted a proposal for the establishment of a Department of Food Science and Technology. Taking cognizance of the ongoing Food Technology major for undergraduates, it was noted that although there had been increasing student interest in the field, the students were concerned over lack of a department with which they could identify. Also, the University was not fully complying with the university instructional standards recommended by the Institute of Food Technologists. The proposal included recommendations for research, teaching, and extension. It had the strong support of both the College of Agriculture staff and administration, as well as industry (4).

On December 11, 1967, the Board of Regents approved the above proposal, which action also provided for the termination of the Department of Dairy Science (5). The new Department was activated on February 1, 1968. All of the staff members involved in the "manufacturing" segment of the dairy department were automatically transferred to the new Department. Physically, this meant that this staff remained in Dairy Industry Hall. T. E. Hartung, who was chairman of the Department of Poultry Science at the time, was appointed the first chairman of the new Department, serving temporarily as chairman of both Departments.

Broadening the Base and Involving Other Departments (2)

The new Department developed rapidly and well. The dairy products technology section (manufacturing) of the former dairy science department formed the nucleus of the new Department of FS&T. Converting from primarily dairy technology to a more general food processing and preservation program was accomplished by both the ongoing staff gradually modifying their respective programs, and through incorporating other specialties as new staff members came on line. Some of the former dairy technology courses were combined into a single dairy products technology course, and other courses were redefined with broader subject matter representing the total food field. Improved facilities in H. C. Filley Hall to accommodate the broadened program were provided over the years through a number of renovation projects.

Cooperation with other departments having food science segments was enhanced by granting courtesy appointments in FS&T to the appropriate staff members in those other Departments.

Teaching

The Curriculum

The Department now offers a broad spectrum of courses, with the curriculum having been revised in 1977 to bring the program into compliance with the standards of the Institute of Food Technologists (IFT). Modifications in courses offered by other Departments also contribute to the Food, Science and Technology curriculum.

The number of undergraduate majors increased from six in 1968 to 40 in 1978. The Department also offers both MS and PhD degrees. By 1984, the Department had awarded 75 MS degrees and 37 PhD's.

Scholarships and Fellowships

Scholarships are available to undergraduate majors both from the Department and from the Institute of Food Technologists (IFT). Each year the IFT sponsors a national scholarship competition at the freshman and upper class levels. Over the years Nebraska students have done well in this competition. The Department has had at least one freshman scholarship winner each year during most of its existence, and much of the time has had more than one. In terms of total scholarships received in the IFT competition, the Department ranks near the top. The Department has also had numerous recipients of IFT scholarships at the sophomore, junior and senior levels. The De-

partment also has funds that generate income for a number of departmental scholarships which are used extensively at the freshman and sophomore levels.

A number of graduate students in the Department have been successful in obtaining IFT fellowships, and a few have received Ralston Purina graduate fellowships.

Student Clubs

The Food Science Club, including both undergraduate and graduate students, sponsors an ice cream stand at the State Fair, an annual spring tour to food processors, and other activities.

A chapter of Phi Tau Sigma, a national food science honorary, was established at Nebraska in 1977. Phi Tau Sigma sponsors a lecture or seminar for the fall semester program and an annual awards banquet or luncheon in the spring semester.

Research (2)

Research output of the Department has grown continuously since its origin in 1968. In addition to the budget allocated annually by the IANR, staff members in the Department have been successful in obtaining outside grants and contracts. Included among the federal donor agencies have been the HEW, NIH, FDA, USDA, and NSF. State agencies have included the Nebraska Commodity Boards, and the Nebraska Department of Economic Development. Industry grants have been numerous and have included grants from many different companies.

The 1970 State Legislature directed the Station to initiate a new research program in the area of food toxins, and included funds in its appropriation to the University to activate the program. An assistant professor was appointed to carry out the work (8), and a research program on molds and mycotoxins was initiated. This was later expanded to include teaching in the general area of toxicology.

The Department's research program has developed along broad discipline lines and includes research in food chemistry, food microbiology, food toxicology, food processing, and food engineering. Specific research projects include work with proteins, enzymes, carbohydrates, lipids, flavors, analytical methodology, irradiation preservation, sanitation, fermentation technology, pathogenic microorganisms, mycology, mycotoxins, cereal technology, poultry products technology, and physical properties of foods. Principal areas of research of courtesy appointed faculty include meat technology, wheat quality, and institutional food service systems. Each research project is covered under a broad umbrella experiment station (Agricultural Research Division) project written by individual faculty members. In addition, several regional research projects are also active within the Department.

The research/teaching staff with primary appointments in the Department, starting not later than 1974, and with at least 10 years on the staff of the UN are: Roy G. Arnold, L. B. Bullerman, Glenn Froning, Ted E. Hartung, Burt R. Maxcy, Lowell D. Satterlee, and Kem H. Shahani.

Extension (2)

A number of the staff members have held joint appointments in Extension along with the Station or Resident Instruction. However, the only staff member with a primary appointment in the CES by 1974 was T. Allen Evans. Subjects of principal emphasis in Extension have been food technology, marketing, food safety, and consumer information. Numerous short courses, workshops and technical programs have been presented to the food industry, including the Better Process Control School, a national program sponsored by the Food Processors Institute.

Dairy/Food Pilot Plant (formerly the creamery)

The Department of Dairy Science, (see Part V, Chapter 9 for further details) formerly, and more recently the Department of Food Science and Technology, have been widely and favorably known for operating the retail dairy store—especially for the assortment of cheeses and the large and delicious ice cream cones. The dairy store has always served as a partial outlet for the various dairy products produced in the research and educational programs of the dairy/food pilot plant.

Over the years, there had been pressures from commercial interests to reduce or eliminate the production of dairy products in the creamery and sales of the dairy products, which operation has been labeled from time to time as unfair competition with private industry. Partially in response to such pressure on the University Administration and partially in the best interests of meeting the changing needs of the Department, Chairman T. E. Hartung, on October 14, 1968, submitted a report to Dean Frolik outlining a proposed major operational change in the plant. The proposal provided for closing out the daily operation of milk processing and shifting to a broadened role of a pilot food plant. The proposal was accepted and made effective as of July 1, 1970. The remaining dairy activity consisted principally of manufacturing ice cream and fermented dairy products. Other food products produced in research and teaching were not offered for sale. The auxiliary cash budget, as a result of the change in operations, was lowered from $256,750 in 1969-70 to $57,120 in 1970-71 (6).

Today the dairy store sells these products manufactured in the food pilot plant: various kinds of aged cheeses, yogurt, and ice cream. In addition cottage cheese, milk, and half-and-half produced by a private company(ies) and obtained wholesale by the University on a bid basis, are sold at the retail store. The store also sells eggs produced by the poultry section

The dairy store sells products manufactured in the IANR food pilot plant and some other items produced by private companies and obtained wholesale by the University on a bid basis. Ice cream cones sold here are a favorite with students, staff and off-campus visitors.

of the animal science department. Ice cream cones sold by the store remain a great favorite. To school groups, University students and the public in general, the cones constitute a tradition at the IANR[2].

International Programs
(see also Part V, Chapter 9)

Richard R. Day, on leave from his position at the University of Minnesota, was on appointment with University of Nebraska Mission in Colombia from January 1, 1969 to June 30, 1971. His assignment was with the National University at Medellin. For the year 1970 he reported taking full responsibility for teaching a course in advanced dairy technology during both semesters. He also assisted in teaching three other courses in dairy manufacturing (11, 1970, p 153). He reported that after a delay due to lack of adequate water pressure, the dairy plant had finally become operative in January 1970 (11, 1971, p 38).

Day's final report was bittersweet (11, 1971, p 38-41). On the negative side, he reported that although the University had deposited money in the bank for the purchase of a truck with a stainless steel tank for transporting milk from the University farm to the dairy plant, after 20 months due to "red tape", the truck had not yet been delivered. He reported that the student situation, during the two and one-half years that the Nebraska program had been underway, was not favorable. He stated: ". . . .the efforts of any outside professor are suspicious in the eyes of many staff and almost all students . . . At least half of the time that I have been in Medellin we have had vacations, puentes (extra days after holidays), dias de fiesta (traditional holidays), asembleas (union meetings), manifestaciones (demonstrations), huelgas (strikes), estado de sitio (curfews), agitacion (excited discussions), etc."

On the positive side, Day reported the following:

(1) The dairy manufacturing plant was in operation with the production of cheese, ice cream, sherbert, butter, buttermilk, cottage cheese, chocolate milk and milk.
2) A sales room for the outlet of the above products had been built and was operational.
3) A model farm bulk milk room had been constructed at the University farm and was to go into use within a month.
4) The analytical laboratory had been remodeled and was in constant use.
5) The curriculum in dairy products technology had been revised.
6) Visual aids were developed, 18 reference books had been added, and a number of trade journals were being received.
7) Two counterparts, Mejfa and Serna, had gained much experience in working in the dairy plant.
8) A bridge between the national University and industry had been established.
9) A number of experiments had been completed.

The Food Processing Center (9, 10)

The Food Processing Center, dedicated July 19, 1983, is an administrative unit that exists both within and outside the University. It is administered under the head of the Department of Food Science and Technology but it is also directly linked to the Nebraska Department of Economic Development. The Center is staffed with some scientists holding partial appointments in the Center and partial appointments in an academic department of the University. Other University faculty appointed as Center staff collaborate on a part time basis with the Center although not directly. These individuals work on Center projects as needed. Nebraska Department of Economic Development staff also collaborate on a part time basis as needed. In addition, the Center has employed two full time marketing specialists who work exclusively

[2]In 1987 a second retail outlet was established in the Nebraska Union on the City Campus.

with the food processing and distribution industry. The Food Processing Center's operating budget is funded by state development funds and industry grants.

The objectives of the Food Processing Center are to: 1) aid current food industries in becoming more efficient, productive and diverse; 2) stimulate the development of new food processing industries in Nebraska; 3) assist new as well as existing food processing industries by offering educational programs for management, staff and employees from these industries; and 4) aid various commodity groups and state agencies in developing export markets for Nebraska commodities.

Application research, which focuses on new or improved uses or application of food products or commodities produced in Nebraska, is also a major part of the Center's research program. This research utilizes data generated in Nebraska as well as elsewhere.

Planned Building Expansion (1987)

Construction of a Food Industry Complex will begin in the fall of 1987. It will be built around the present H. C. Filley Hall. To cost an estimated $10,570,000, the expansion and remodeling will house the Food Processing Center, the Agricultural Transportation and Marketing Center, the Department of Food Science and Technology, and the Department of Agricultural Economics. The sources of funding will be one-half federal, with the remainder being provided by state and private sources (12, 13).

Recipients of the UNL Distinguished Teaching Award

Roy G. Arnold	1977
Lowell D. Satterlee	1979
John H. Rupnow	1985

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13. Lincoln Journal. June 6, 1987. Food industry complex unveiled. Lincoln, NE.

Chapter 12 - Forestry, Fisheries and Wildlife[1]

Contents

Names of Department[2]

Forestry	1903-1915 (2, p 89).	Forestry, Fisheries and Wildlife, and Nebraska Forest Service	1977-present
Horticulture and Forestry	1959-1974		
Forestry	1974-1977		

Administrators

Name	Title	Period Served
Francis G. Miller	Professor	1903-1907 (2, p 89).
F. J. Phillips	Professor	1907-1911 (2, p 132)
W. J. Morrill	Professor	1911-1915 (2, p 132, 6).
Joseph O. Young	Chairman	1958-1974
Ellsworth H. Benson	Acting Chm.	1974-1975
Mitchell D. Ferrill	Chairman	1975-1977
Mitchell D. Ferrill	Head	1977-1980
James R. Brandle	Acting Head	1981
Gary L. Hergenrader	Head	1981-present

Locations on Campus

Years	Dept./Activity	Name of Building
1937-1949	Agronomy/Game Mgt.	Crops Laboratory (now the Kiesselbach Crops Research Laboratory)
1949-1955	Poultry/Wildlife Mgt.	Poultry Husbandry Hall (old)[3]
1955-1973	Poultry/Wildlife Mgt.	Poultry Husbandry Hall[4]
1973-1977	Poultry and Wildlife Science/Wildlife Management	Poultry Science Hall
1924-1959	Extension forestry with limited classroom instruction (not in any Department)	Plant Industry
1959-1974	Horticulture and Forestry	Plant Industry
1974-1977	Forestry	Miller Hall, Forestry Service Laboratory (USDA)
1977-present	Forestry, Fisheries and Wildlife	Plant Industry Hall, Natural Resources Hall, Forestry Service Laboratory (USDA)

[1]The authors gratefully acknowledge the assistance of Gary L. Hergenrader and Howard L. Wiegers in providing material used in this chapter.

[2]Wildlife management was taught in the Departments of Agronomy and Poultry, beginning in 1937-38; and Extension forestry programs were started in 1926, the latter without departmental affiliations.

[3]Earlier (old) Dairy Husbandry Hall, later Agricultural Administrative Annex.

[4]Earlier Motor Truck Laboratory renamed Poultry Husbandry Hall in 1974 and renamed Mussehl Hall in 1979.

Historical Development

The Period 1903-1920 (2, pp 89, 127)

During this period most of the instruction in forestry was conducted on the city campus. That the University had high hopes for forestry is evident from the extent of the forestry curriculum as listed in the 1904-05 bulletin, which consisted of the following courses: 1) introduction to forestry; 2) silviculture; 3) forest measurements; 4) forest measurements and management; 5) forest utilization; 6) forest history and policy; 7) teachers' course (for teachers of nature study in public schools); and 8) farm forestry (7). Francis G. Miller, a graduate of the Yale School of Forestry, the first professor of forestry, was appointed a member of the Station staff in 1903 (2). Upon completion of the Department's curriculum, students were granted the degree of Bachelor of Science in Forestry.

The Department had an excellent reputation and among its graduates were a number who subsequently distinguished themselves in the forestry profession. The staff conducted surveys and studies on the timber resources of Nebraska, the adaptability of various species, and other phases of Great Plains forestry (10).

Due apparently to the dearth of natural forests in the state, the Department of Forestry was abolished in 1915 (2). No forestry courses were offered from 1915 through 1919-20. Also there was no work in wildlife for this period (7).

The Period 1920-1959

Forestry. There was no Department of Forestry, nor did the term "forestry" appear in the title of any Department during this period.

The reappearance of forestry instruction took place in 1920-21. In the College of Agriculture bulletin for that school year, Cleo C. Wiggans, a staff member in the Department of Horticulture, was listed as instructor of a course entitled "farm forestry". Subsequently others taught the course. In 1958-59, a course entitled "rural woodlands" was taught by Walter T. Bagley, a forester in the Department of Horticulture. This one course constituted the total offerings of forestry instruction in the College of Agriculture that year (7).

Primarily to comply with the provisions of the Clarke-McNary Act passed by the U.S. Congress in 1924, Extension established the position of extension forester. The duties consisted of tree distribution and education. The position was first filled by Clayton W. Watkins, effective September 1, 1926 (5), who remained extension forester until 1940 (except for two years, 1935-36, when he was on leave). During the leave period, Earl G. Maxwell served as extension forester, then as assistant to Watkins until 1940 at which time he was made extension forester. Maxwell served in this capacity until 1953 when he retired. Karl A. Loerch succeeded Maxwell in 1953 (8).

It will be noted that during this period Extension specialists did not have official departmental affiliations.

The first forester listed in the Station annual reports during this period was Ralph A. Reed (USDA), in 1953. By the end of the period, 1959, there were three staff members listed. They were, in addition to Reed, W. T. Bagley and C. E. Boldt (USDA). All three were members of the Department of Horticulture and were designated in the Station annual reports as "horticulturists" (6).

Wildlife Management. Wildlife interests in the College of Agriculture were first registered by Myron Swenk, the entomologist, who was active in this area for a few years in the late 1920's and early 30's. Most of his work centered around economic losses of crops, particularly from pheasants. He also described the distributions of some Nebraska mammals (10.

The first course in wildlife management in Nebraska was taught by Anton L. Frolik, who had received his PhD degree from the University of Wisconsin with a major in agronomy and a minor in wildlife management, the latter under the direction of the renowned Aldo Leopold[5].

Assisted for one year by William Tolstead, a botanist, Frolik taught the first course, entitled "game management" in the Department of Agronomy in 1937-38. Frolik continued to teach the course through 1939-40. As a member of the Army Reserve, he was called into military service in the fall of 1940.

The course continued to be taught in the Agronomy Department on a part time basis, first by Lloyd P. Vance of the Poultry Department and later by Roald Amundson of the Nebraska Game, Forestation, and Parks Commission.

In 1948-49 F. D. Keim, chairman of the Department of Agronomy, asked Howard L. Wiegers, staff member in the Department of Poultry Husbandry, to take charge of the course (1). Wiegers (who as a student had been an advisee of Anton L. Frolik) accepted the assignment and, beginning with the 1949-50 bulletin, the course was renamed "wildlife management" with Wiegers as instructor (7).

1959 and After

Forestry. In 1959, shortly after J. O. Young came to Nebraska as chairman of the Department of Horticulture, "Forestry" was added to the name of the Department. It remained there until 1974 at which time the forestry segment was transferred from Horticulture and Forestry to a new Department of Forestry. The history of forestry during the period 1959-1974, is covered in Part V, Chapter 15.

Fisheries. In 1964 the Department of Zoology (now a part of the School of Life Sciences) arranged with the Nebraska Game, Forestation and Parks Commis-

[5]Leopold has been described in the *National Geographic* as one of the first professors of wildlife management, craftsman, forester, and remarkable conservationist. He is credited with elevating ecology to philosophy and literature (4).

sion to have one of their biologists, Larry Morris, teach a course in ichthyology. Until that time no formal instruction in the fisheries area was offered within the University. In 1967 Gary Hergenrader was employed and assigned responsibility for ichthyology. In subsequent years he also began teaching the introductory limnology course which had been initiated in the early 1960's by William Coil, a parasitologist. In subsequent years an advanced course in limnology dealing mainly with river limnology was developed by Hergenrader (10).

Wildlife Management. As indicated, wildlife management continued to be taught in the Poultry Department, which was renamed the Department of Poultry and Wildlife Science in 1973. There continued to be increasing interest and activity in the wildlife management field which discipline was continued in the Department of Poultry and Wildlife Science until the Department was terminated in 1977.

On April 15, 1976 the *Lincoln Sunday Journal-Star* named Howard L. Wiegers "Nebraska's Outstanding Wildlife Conservationist". As a part of the honor, the newspaper named their annual award for wildlife conservation the "Howard L. Wiegers—Sunday Journal-Star Nebraska Outstanding Wildlife Conservation Award". Thus annually, as the award is made and publicized, Nebraskans are reminded of the great contributions made by Wiegers to the field of wildlife.

A new department is formed. The Department of Forestry lasted from 1974 to 1977, at which time it was folded into a new Department of Forestry, Fisheries and Wildlife (FF&W), as was the wildlife segment of the former Department of Poultry and Wildlife Science.

When FF&W was established in 1977, the Nebraska Forest Service (NFS) was created as a section of the Department. The positions of the State Forester and the head of the Department were combined into one position.

In 1981, when Hergenrader became head of FF&W and state forester, the courses he had been teaching in the School of Life Sciences, ichthyology, limnology, and advanced limnology, were transferred to the Department of FF&W in the IANR.

The UNL Wildlife Club

Students interested in a wildlife career held meetings for several years before becoming officially recognized by the University of Nebraska as a student club. They started meeting before there was a wildlife major in the College of Agriculture. The only faculty member devoting time to wildlife management was Howard L. Wiegers, with one-half of his time being assigned to the discipline.

In 1959 the group successfully petitioned the Office of Student Affairs for official recognition by the University, thus officially starting the UNL Wildlife Club. Harry "Ed" Gates was elected first president, and Gary L. Hergenrader the first vice president.

One of the major thrusts developed by the Club was to attempt to get a wildlife major established in the College of Agriculture. Student interest was manifested by the fact that the number of "would be" majors increased to 200, which constituted approximately 14 percent of the entire College enrollment. The Club continued to exert pressure to obtain the wildlife management major through holding forums with prominent officials both within and outside the University present, through assistance from the Izaak Walton League, through the Legislature, and through various other individual efforts. Success was attained as shown in the 1969-70 College bulletin (7) which included a group major entitled "wildlife conservation and management". In 1972-73 (7) the Catalog listed the "wildlife management option" under the "natural resources major". Presently (7, 1986), the "wildlife resources option" is listed under the "natural resources major" for which the Department of Forestry, Fisheries and Wildlife has administrative responsibility.

Included among the Club activities are: 1) holding a large annual banquet, 2) conducting an annual "hands on" seminar; and 3) providing instruction in wildlife to Lincoln students in grades one through six over a three-week period during and after National Wildlife Week.

Membership in the Club ranges from 60 to 100.

Major Office

Alumni

Served as member of the Nebraska Legislature:
Lee O. Rupp—1983-1987

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Chapter 13. 4-H & Youth Development[1]

Contents

Names of the Department

Name	Year(s)	Source of Information
Boys' and Girls' Clubs (or Club Work)	1913-1916	Annual Extension Reports (4)
Junior Extension Work[2]	1917	Annual Extension Reports (4)
Junior Department[2]	1918	Annual Extension Reports (4)
Junior Extension Work/Boys' and Girls' Club Work	1919	Annual Extension Reports (4)
Boys' and Girls' Clubs[3] (or Club Work)	1920-1928	Annual Extension Reports (4)
Boys' and Girls' 4-H Clubs[4] (or Club Work)	1929-1948	Annual Extension Reports (4)
Rural Youth	1948-1951	Annual Extension Reports (4)
State 4-H Clubs	1949-1951	Annual Extension Reports (4)
4-H Clubs and Rural Youth (RY)	1952-1954	Annual Extension Reports (4)
4-H Clubs and Young Men and Women (YMW)	1955-1964	Annual Extension Reports (4), and CES personnel lists
Youth Development (4-H and YMW)	1965-1966	CES personnel lists
Youth Development	1966-1971	CES personnel lists
4-H Youth Development	1971-1975	CES personnel lists
4-H & Youth Development	1975-present	CES personnel lists

Administrators (1, 3, 4, 8)

Name	Title	Years in Position
E. C. Bishop	Deputy State Supt. of Public Instruction	1905-1909
E. C. Bishop	State Supt. of Public Instruction	1909-1911
Val Keyser	Office of Public Instruction	1911
Huldah Peterson Anderson	State Agent in charge of Club Work	1912-1914
Huldah Peterson Anderson (Girls) C. H. Besson (Boys)	State Leaders in Boys' & Girls' Club Work	1915
L. T. Skinner	State Leader in Boys' & Girls' Club Work	1916
C. W. Watson	In charge, Junior Ext. Work	1917
C. W. Watson	In charge, Junior Dept.	1918
L. I. Frisbie	State Agent, Boys' & Girls' Clubs	1919-1928
L. I. Frisbie	State Agent/Leader, Boys' & Girls' 4-H Clubs or Club Work	1929-1948
Edward W. Janike	Boys' & Girls' State 4-H Leader	1949-1950
Guy R. Davis	State Rural Youth Leader	1948-1951
Wesley M. Antes	State Leader, 4-H Clubs	1951

[1]The authors gratefully acknowledge the assistance of John D. Orr, professor and extension specialist, 4-H & Youth Development, in assembling source material used in writing this Chapter.

[2]It appears that the names were selected to be more in harmony with the WW I efforts.

[3]In 1928, the symbol "4-H" appeared for the first time in the annual Extension reports but only in the write-up, not in the sectional heading.

[4]Beginning in 1930, the symbol "4-H" sometimes appeared in the headings in the annual Extension reports and sometimes not, but the symbol has always appeared in the write-ups since that time.

Wesley M. Antes	State Leader, 4-H Clubs and Rural Youth	1952-1954
Wesley M. Antes	State Leader, 4-H Clubs and Young Men and Women	1955-1964
Wesley M. Antes	State Leader, Youth Development (4-H and YMW)	1965-1966
Wesley M. Antes	State Leader, Youth Development	1966-1971
Wesley M. Antes	State Leader, 4-H Youth Development Cooperative Extension Service	1971-1975
William E. Caldwell	Assistant Director for 4-H & Youth Development	1975-present

Staff

Persons who served on the 4-H staff for at least 25 years, and were on the staff between 1924 and 1974 are: Wesley M. Antes, Guy R. Davis, Lucius I. Frisbie, Jessie G. Greene, Dorothea F. Holstein, C. Dean Johnson, John D. Orr, Louie E. Rudman, Kenneth G. Schmidt, Donald D. Siffring (North Platte and Panhandle Stations), Elaine M. Skucius, and Roy F. Stohler (Northeast Station).

Headquarters Location

All available evidence indicates that Club work was headquartered in the State Capitol from 1905 until 1911 and with Extension in Agricultural Hall since 1912.

Early History

Orr stated in about 1973 (3) that "No one person can be credited with origination, development, or maintenance of the 4-H program". Brokaw attributed the original idea in Nebraska to E. C. Bishop, a teacher at Middle Creek School, District 22 in Seward County. Bishop began to get the concept of 4-H (though not under that name) in 1893. Continuing to build on his original idea, and while serving as York County Superintendent of Schools, in the fall of 1903, he distributed a free quart of corn to boys in Fillmore, Seward, and York Counties, along with instructions on planting, and required that each recipient exhibit 10 ears of corn at the 1904 State Corn Show. In 1905, Bishop was appointed to the Nebraska State Superintendent's office in charge of promoting boys and girls club work. He served as State Superintendent from 1909 to 1911. In 1911 he moved to Iowa where he continued his work in boys' and girls' club work (1).

The College became involved in boys' and girls' club work via the Farmers' Institutes, ". . . the work became a definite part of . . ." their program (2, p 3). The State Superintendent, meanwhile, reported an attendance of 500 boys at the Farmers' Institute meetings or at their shows or fairs in the winter of 1905-06 (2 p 3).

It appears that for a time both the public schools and Extension were involved in promoting boys' and girls' club work. Huldah Peterson Anderson was named assistant state agent in Extension in charge of club work in 1912 (3). In 1913, 25 county school superintendents were promoting the program (3), as were four county extension agents. Extension reported (2, pp 3-4) "In 1913 the State Superintendent of Schools turned over his part in this program to the agricultural extension department of the College, and from that time on boys' and girls' clubs were a definite part of the extension program. During the period from 1905 to 1913 . . . completions were a difficult problem . . . During the first years a boy or girl was called a member of a club if he signed an application for the lessons."

The term "Boys' and Girls'" Club Work was used for the first time in both the Station and Extension (4) annual reports for 1914. Both made mention of the fact that "One club leader (Huldah Peterson Anderson) has devoted her entire time to the club work during the past year, and she will have two assistants during 1915".

As late as 1917, it is apparent from the report of an Extension committee that Extension preferred all Club work be handled through the offices of the county agent. However, it was noted that county superintendents in some counties were still involved in the work. The committee recommended that where this was the case ". . . the former or old plan of conducting the work might continue in force . . ." (4, 1917, p 4).

"During the period of WW I there was a great expansion in numbers of boys and girls applying for lessons, but the period can be said to be more of an interruption of the development of plans for club organization . . . from (1919) club work has shown a wonderful development" (2, p 4).

Purpose and Structure

4-H is the youth education program of Cooperative Extension Service. It consists of a cooperative effort among federal, state and local governments. "The mission of 4-H in Nebraska is to help youth become self directing, productive and contributing members of society" (6).

The 4-H and Youth Development Department heads up the program statewide, with assistance from state and center subject matter specialists, and with leadership in the counties being provided by the County Extension offices (6). In addition, there were 14,759 4-H volunteer leaders in Nebraska in 1984 (6).

Whereas for many years participation in 4-H meant belonging to an organized club, this is no longer the case. Today youth may participate (enroll) in 4-H in

any one of the following: organized 4-H Clubs, special interest groups, school enrichment programs, individual study, and/or instructional TV series. An interesting observation is that initially the 4-H program was conducted through and by the schools. Gradually a shift took place wherein Extension took over, with the schools largely withdrawing from the program. Now the program has gone the full circle with 4-H being in Extension and also back in the schools in a major way — in fact, in 1984, 35,193 participants were in school enrichment programs compared to 28,777 in 4-H Clubs (7).

Another major change which has taken place over the years is in the residences of the enrollees. Initially the participants lived on farms. Today the residences, by percentages, are:

Farm	31.8%
Rural & towns under 10,000	29.6%
Cities—10,000 to 50,000	16.2%
Cities over 50,000	22.4%

Subject Matter

During the period 1905 to 1913, club work was devoted almost entirely to corn and cooking (2, p 4). In 1914, the following projects were included: corn, potato, gardening and canning, sewing and cooking (4, 1914, p 16). However, it was stated in the same report that ". . . a special worker was placed in charge of pig club work in Nebraska," and that pig clubs would become one of the major projects. Another worker was hired to give major attention to corn clubs (4, 1914, p 18).

The above notwithstanding, V. S. Culver, Merrick County Agent, reported that in 1914 he planned to organize boys' corn growing clubs, hog raising clubs, and girls' tomato growing clubs (4). In 1913 he had organized two clubs. Also in 1913, Otto H. Liebers organized 15 clubs in Gage County. A. H. Beckhoff reported that six boys took part in a boys' acre corn contest in Seward County, and J. F. Coupe reported four boys in a similar contest in Thurston County (4).

As promised in the 1914 report, pig clubs were added in 1915 (6, 1915, p 10).

In 1917 egg producing and chicken raising were added to the projects (4, 1917). Recalling that WW I was in progress, it is noted that for the year ending June 30, 1918, the following clubs were included in the Extension program: garden, corn, potato, pig, chicken, war bread, canning, drying by communities, and Junior Red Cross (4, 1918, p 22). After the close of the War, for the year ending June 30, 1920, the following were the club projects: pig, sheep, cooking and baking, home canning, hot lunch, calf (both dairy and beef), poultry, potato, garden, and garment making (4, 1920).

The kinds of clubs, by 10-year periods, beginning in 1924 were:

1924: baby beef, beef calf, canning, clothing, cooking, corn, dairy calf, farm accounts, garden, hot lunch, keep well, potato, poultry, rope, sheep, and swine (4, 1924).

1934: baby beef, bee, bird, canning, clothing, cooking, corn, dairy, farm account, farm shop, fix it, forestry, gas engine, garden, girls room, horse and mule, hot lunch, keep well, poultry, potato, rope, sheep, small grain, surveying, swine, and weed (4, 1934, p 27).

1944: types of clubs grouped — number of different clubs shown in parenthesis if more than one: agronomy 4); agricultural engineering 6); animal husbandry 5); bee; bird; dairy; farm account; fix it; forestry; health; home economics 7); horticulture 4); poultry; and war activities.

1954: The annual report for this year contained the following statement "All phases of agricultural and home economics subject matter club projects, applicable to youth, are carried by boys and girls of the state." (4, 1954, p 25).

1964: ". . . projects in agriculture, home economics, citizenship, and personal development" (5, p 18).

1974: livestock, poultry, crops, engineering, conservation, environmental maintenance, foods, nutrition, clothing, home furnishings, home living, personal development, citizenship, leadership, bicycling, dog, and "do your own things" (4).

1984: animals; plants and soils; mechanical science; engineering; natural resources; economics; jobs and careers; citizenship and community development; leisure and cultural education; energy; health, safety; individual and family resources; and communications (7). Orr has stated: "Today there is a free structure that allows for self-determination in many of the subject matter areas. In Nebraska 4-H, one of the tests for the development of a new project is the relationship of that project to research in a UN Department" (1).

State and National Conferences (1)

State

The first state conference of 4-H took place in December 1905, when the program was under the direction of the deputy state superintendent of public instruction. Five hundred youth attended the four day conclave. The attendees were divided into the Nebraska Girls' Domestic Science Association and the Nebraska Boys' Agricultural Association. Activities consisted of adopting constitutions, judging of corn samples, speaking, and election of officers. These conferences were continued each year through 1910.

It is not entirely clear when "Club Week" was started. This activity was reported as follows: "Boys' and Girls' Club Week, held the first week of June 1921, was the largest ever held with 202 club members being in attendance. Of this number, all except 43 had earned free trips as County Champion or for excellent record

in their Club demonstration" (4, 1921, p 4).

Boys' and Girls' Club Week was held annually from 1921 to 1940, and 4-H Club Week from 1941 to 1977 (except for 1943 and 1945). From 1978 to the present time, the event has been known as the State 4-H Conference. It is planned and conducted by teen volunteers. Among the many activities that are included, two noteworthy ones are the Lincoln Chamber of Commerce banquet started in 1922 and the Radio Station KFAB public speaking contest started in 1942. Attendance at these conferences numbers in the hundreds.

National

One of the greatest accomplishments that a 4-H participant can attain is to be selected as one of the winners (two boys and two girls from each state annually) to attend the National 4-H Conference held annually in Washington, D. C. The first of these, then called the National Camp, was started in 1927. The programs consist of speeches, tours, and recreation.

The 4-H pledge, officially adopted at the first Camp, reads as follows:

> "I pledge my head to clearer thinking,
> my heart to greater loyalty,
> my hands to larger service, and
> my health to better living,
> for my club, my community, my country, and my world"[5].

Also the club motto "To make the best better" was adopted at that first conference.

Camping (1)

Camping has always been a popular segment of the 4-H program. The first camp was held in 1912 on the State Fairgrounds, with an attendance of 75 boys. Livestock judging was emphasized in the educational work. Similar camps were continued until the onset of WW I, at which time they were discontinued.

During the 1920's, camping consisted principally of 4-H Club members from two or three counties camping together.

The first conservation camp was held at the Seward Park in 1931. Subsequently, the activity was moved to Chadron and finally to the Nebraska State 4-H Camp at Halsey. The name has been changed, first to the Leadership and Environment Camp, and still later to the Natural Resources and Leadership Camp.

From 1947 to 1974, during June and July, an Extension "traveling camp crew" would provide "housekeeping" and educational equipment, and supplies for eight camps over the state. The traveling crew would also provide leadership, teach crafts, lead singing, and direct recreational activities. Being a "crew" member must have been an inspiring but rugged experience.

The KFAB public speaking contest is an important activity during the State 4-H Conference. Jean Beck of Fremont, pictured here, was the winner in 1947. She is now Mrs. Dallas Schroeder of Des Moines, Iowa.

Today (1987) the get-togethers are held at four excellent 4-H camps (all constructed with privately raised funds) over the state as follows:

1) State 4-H Camp at Halsey, dedicated in 1962. Winterized. Capacity - 150 campers.
2) South Central 4-H Center, located near Republican City, dedicated in 1976. Capacity - 75 campers.
3) Lodgepole Valley 4-H Youth Camp, located on the southeast edge of Sidney. Completed in 1976. Winterized. Capacity - 100 campers.
4) Eastern Nebraska 4-H Center, overlooks the Platte River, south of Gretna in Sarpy County. Dedicated in 1982. Winterized. Capacity - 200 campers.

Subjects covered during these camps include (in 1985): biology, natural resources, computers, photography, leadership, counselor training and others.

Fairs and Livestock Shows

The first participation of 4-H members in Fairs reported by Extension occurred in 1918 or 1919 (it is not always clear in the annual Extension reports what period of time is being covered). The fall of 1918 is not too likely as the starting date because WW I was

[5]The last phrase "and my world" was added in 1973.

(Above) The first plans for the State 4-H Camp at Halsey were produced by University of Nebraska architecture students. Inspecting a model in 1960 are (from left) W. Rundall Peterson, then Harlan County extension agent; John D. Orr, associate state 4-H leader; James T. Kenner, president of the Association for 4-H Development; and Edward W. Janike, associate director of the Cooperative Extension Service.

(Below) Final plans for the State 4-H Camp were drawn by Emil Christensen, a Columbus, Nebraska architect. This picture was taken in 1962 at the dedication of the camp. The facility is booked from April 1 to November 1 every year for a variety of 4-H and other events.

still in progress at the time the State Fair would have been held. At any rate, the report for "the year ending June 30, 1919" (4) stated: "County Fairs, State Fairs, Bankers, Businessmen and corporations have been very enthusiastic over this type of (Junior) Extension work . . . There have been approximately $15,000 offered as prizes to boys' and girls' club work within the state during the past year".

Demonstrations, which have become such an integral part of 4-H activities at Fairs, also received attention in the above Extension report as follows: "Demonstrational work was made an important feature in Nebraska activities during the past year . . . A number of (poultry) clubs over the state have found the benefits which could be derived from demonstrational work and from the time of the early County Fairs, thru the State Fair Season, have given various demonstrations . . ." (4, June 30, 1919).

Exhibiting at the State Fair continued to expand. For example, the next year 103 boys and girls exhibited 149 pigs at the State Fair. Beef club judging teams competed at the State Fair, the Interstate Fair at Sioux City, and at the Southeastern Fair at Atlanta, Georgia. The dairy judging team from Douglas County, including one girl, was high at the State Fair and represented Nebraska at the National Dairy Show (4, 1920). Judging teams winning at the State Fair continued to represent Nebraska at national and, in some cases, international contests.

4-H activities at the State Fair have continued to increase in extent and quality to the point where at the present time 4-H constitutes an important segment of the entire Fair. That this is well recognized by the Nebraska State Board of Agriculture is shown by the fact that during each of the following years, a bigger and more elaborate building has been made available for the Club programs: 1921, 1931, and 1981. The 1981 complex includes demonstration rooms, administration and press offices, concession plaza, and a new 4-H livestock area.

A music contest, first held in 1929, constitutes a major 4-H activity at the Fair.

There is not a county fair in Nebraska that does not include a 4-H section (1).

Other livestock shows in which Nebraska 4-H club members exhibit, and the years in which they were first invited to participate, are as follows: St. Joseph, Missouri, Interstate Baby Beef and Pig Club Show in 1919; the Fremont Fair in 1922; and the Ak-Sar-Ben 4-H Livestock Exposition (largest in the world) in 1927 (1).

International Participation (1)

The International 4-H Youth Exchange (IFYE) program provides for U.S. 4-H members living with families for a period of time in any one of many different foreign countries, and, in turn, for foreign youth from many different foreign countries living with host families in the U.S. Nebraska started participating in

this program in 1948. Up to 1985 over 2,000 Nebraska families had hosted foreign youth, and over 500 Nebraska 4-H members had lived with families abroad.

The largest international program in Nebraska has been the Nebraska 4-H/Japan-Labo Exchange. This program provides for Japanese youth living and working with Nebraska farm families and also for taking a three months course at the College of Agriculture. Since the program was started in 1971, over 1,100 Japanese youth have participated.

A Nebraska IFYE Alumni Organization was started in 1948 and an IFYE Host Family Association was organized in 1962.

Enrollment (1, p 20)

Enrollment (participation) in 4-H at ten-year intervals is shown below.

Year	Number
1895	25
1905	500
1915	5,508
1925	7,213
1935	15,955
1945	14,098
1955	28,744
1965	32,788
1975	54,704
1985	63,365

In 1984, 51 percent of all participants in 4-H programs ranged in age from 9 to 11 years of age, 33 percent from 12 to 14 years, and 16 percent from 15 to 19 years (7).

Rural Youth (RY)/Young Men and Women (YMW)

The first mention of a rural youth program (on an organized basis and separate from 4-H) appeared in the 1948 Annual Extension Report (4), the same year that Guy R. Davis was listed as the State Rural Youth Leader (8). It was stated that RY was ". . . an extension program for the rural youth 17 years and over . . . Social and recreational activities continue to receive the most emphasis. However, all groups are spending some time on educational topics and community activities" (4, 1948).

In time the RY program was renamed the RUY (Rural Urban Youth). Beginning in 1952, administration of the program was combined with that of the State Leader, 4-H Clubs. In 1985 there remained four RUY groups active in the state (10).

The YMW program first appeared in the 1955 Extension annual report (4). Whereas the RY program dealt primarily with single people, the YMW program was adapted more to young married couples. It was intended ". . . to help them get a better start in life and to become more useful to their communities" (4, 1955).

John Orr reported that the membership of the YMW reached a peak in 1962 (9). For that year, Extension reported that the organization had worked with 963 persons in groups and 2,995 others through the YMW programs (10). The YMW program on an organized basis has been dropped as such (10). Extension now continues to work with young adults in various other ways (9).

Related Organizations (1)

University 4-H Club

The University 4-H Club was organized with encouragement of the then State Agent, Boys' and Girls' Clubs, in 1923. A 1927 newspaper article outlined the purpose of the club as follows: "The club encourages former club members to become leaders of clubs and urges enrollment of 4-H club members in the UN, that they may carry the spirit of the University back to their home communities. Scholarship is encouraged by annual award of medals to the high ranking 4-H club member in each class."

Among a variety of activities conducted by the Club, the two major ones are: 1) a "host school weekend" wherein high school juniors and seniors are invited to spend a weekend with University 4-H Club members on a one-to-one basis which includes living with the University student host in a dormitory, fraternity, sorority, or apartment, as the case may be; and 2) a vocal music group from the membership known as the "Outreachers" organized by Dorothea Holstein in 1968. The group appears at various functions throughout the year, and in 1968 performed at the Kennedy Center for the Performing Arts in Washington, D. C.

Association for 4-H Development

The Nebraska Association for 4-H Development was chartered with the State of Nebraska August 15, 1958 through December 12, 1985. The name Nebraska 4-H Development Foundation was filed as a revision on December 12, 1985.

The Nebraska 4-H Development Foundation is a non-profit organization dedicated to generating funds for the Nebraska 4-H program. The funds are utilized for adult and teen leader training, 4-H recognition and incentives, scholarships, trips and awards, 4-H leader incentives and development, and capital construction at the State 4-H Camp, Eastern Nebraska 4-H Center, South Central 4-H Center and Lodgepole Valley 4-H Camp (11).

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Chapter 14. Home Economics - Department, School, College[1]

Contents

Names of Administrative Unit

School of Domestic Science	1898-1906	Department of Home Economics (in the College of Agriculture)	1909-1962
Home Economics (Department) (in the Industrial College)	1907-1908	School of Home Economics	1962-1970
		College of Home Economics	1970-present

Administrators

Chief Administrators

Name	Title	Years Served
Rosa Bouton	Head	1898-1912
Alice M. Loomis	Head	1912-1917
Julia Vance	Acting Head	1917-1918
Alice M. Loomis	Head	1918-1919
Margaret Fedde	Chairman	1919-1950
Doretta Schlaphoff	Chairman	1950-1954
Florence McKinney	Chairman	1954-1962
Hazel Fox	Acting Director (School)	1962-1963
Virginia Y. Trotter	Director (School)	1963-1970
Virginia Y. Trotter	Dean (College) and Asst. Director, AES	1970-1972
Hazel M. Anthony	Dean (College)	1972-1986
Karen E. Craig	Dean (College)	1986-present

Other Administrators

Hazel Anthony	Associate Dean	1970-1972
Ruby Gingles	Associate Director (School of of Home Economics)	1967-1970
Agnes Arthaud	Assistant Dean	1972-1975
Patricia Sailor	Associate Dean	1973-1975

[1]The authors gratefully acknowledge the assistance of Hazel Anthony in the writing of this chapter.

Roberta Sward	Assistant Dean	1975-present
John C. Woodward	Associate Dean	1975-1986
Lorraine Brandt	Assistant Dean	1978-present
Patricia Knaub	Associate Dean	1987-present
Lois Schwab	Associate Dean	1987-present

(After 1970, includes only administrators with joint appointments in IANR.)

Location of Headquarters

Mechanic Arts Hall — 1898-1909
Old Home Economics — 1909-1973
New Home Economics — 1974-present

Home Economics and Its Leaders

In 1892, a young chemistry professor—Rosa Bouton—asked that she be allowed to teach a scientifically based course in food and nutrition. The foods course—first offered in 1894 and called "domestic chemistry"—remained in the Department of Chemistry until 1898 when a School of Domestic Science was started with Bouton as the sole instructor (1). This school was entirely independent of the School of Agriculture[2]

At her own expense, Bouton had spent the summer of 1898 in Boston studying the methods of teaching domestic science. That fall the University gave her a grant of $15 to equip a laboratory in the Mechanic Arts Building on the City Campus. The following year, she received an appropriation of $400 (2).

At that time, domestic science was a two-year course open to girls 16 years of age or over "who in the opinion of those in charge of the school . . . had the requisite training for properly carrying on the work."

According to a University bulletin explaining the program, the aim of domestic science was . . . "to train the mind and develop character in the kitchen as well as in the laboratory. Special attention is given to the principles of cooking, economical methods of cooking, as well as methods to render food nutritious, palatable and attractive" (3).

The courses offered in the new School were food economics, household economics and advanced cookery.

Eleven students were enrolled in 1899. By 1900 enrollment had grown to 16. Average cost for a year's schooling was $176 (4).

Although the School of Domestic Science was originally intended to give high school girls the opportunity to get training in home economics, college women also showed an interest in the courses, and in 1899 the domestic science courses appeared in the University catalog.

Bouton Resists Move to "the Farm"

In the 1902 Regents' report, Bouton wrote that there were rumors of moving the School to the "farm." She added that if the Regents should see fit to make this move, ". . . the Department of Domestic Science (college courses) should, it seems to me, remain at the university" (19). Bouton apparently did not recognize "the farm" as part of the University.

Despite Bouton's opposition, the School of Domestic Science was moved to the "farm" in January 1909 when construction of the Home Economics Building was completed (14).

As more college women took the courses (college credit was given) and fewer high school students enrolled, the curriculum began to change. In 1905, teacher training was started and the first extension course was offered.

The Board of Regents two-year report ending with 1906 noted that "A four-year course in home economics (college level) has been adopted and work therein begun . . . the course leads to the degree of Bachelor of Science . . . This course being for women what the agricultural, forestry and engineering courses are for men, includes instruction in those vocations which belong peculiarly to women."

In 1907 there were four faculty members, with Bouton as head (5).

Course offerings in 1909 were more numerous and more varied. They included sewing and design; food preparation and selection; general, elementary and advanced cookery; dietetics; industrial art; household administration; teachers' courses; and woodwork and interior finishes (6).

In 1912, the three main areas of study became divisions: household arts (the predecessor to textiles, clothing and design); household science (predecessor to food and nutrition); and household administration (predecessor to home management) (1).

Also in 1912, Alice M. Loomis[3] succeeded Rosa Bouton as head of the Department. Years later, she said of that period and her new assignment: "Home economics was just developing. It had been domestic science. It had been cooking and sewing and my problem was to get science and art into it" (15).

"Once I was involved in designing a correspondence course for foundry workers," Loomis said in a 1979 interview a few months before her hundredth birthday, "They wouldn't have anything to do with a woman. They were pretty tough chaps. So I wrote the course and signed it A. Loomis" (16).

While working toward a BS degree at Kansas State

[2]A Department of Home Economics was added to the School of Agriculture in the fall of 1906 (33).

[3]After leaving her position as Home Economics head in 1919, Alice Loomis held a variety of jobs in and outside Nebraska. In 1931, at age 51, she earned a PhD at Columbia University. She died in 1982 at age 102.

University, she was one of two assistants doing laboratory work. "They decided they only had room for one assistant so they let me go because they said a woman would get married in a couple of years and leave," she said. "It didn't bother me. One door was closed but another was open."

Loomis a Liberal for Her Time

As an administrator, Loomis held somewhat more liberal views about teacher qualifications than some of her contemporaries in education. "It used to be that the school systems wouldn't hire a teacher if she had been seen dancing," she told her interviewer. "While I was responsible for hiring teachers at Nebraska University, I would hire someone even if they liked to dance, but I always tried to do it legally," she said.

By 1910-11, enrollment in home economics had increased to 97 women, compared with 150 men in agriculture. World War I brought a drop in enrollment—but not a severe one. Enrollment for men declined from 310 in 1916-17 to 238 in 1918-19, for a total of 72, and for women from 282 to 209 for a total of 73. The reason for the almost identical reduction in numbers for the two sexes is not apparent. Perhaps many women dropped out of school to take the place of men on the home front, but this is only conjecture[4].

[4]The College of Agriculture was not primarily a men's college as was often thought by those not connected with it. For example, in 1922-23 there were 293 women (home economics) and 265 men (agriculture) enrolled.

In 1919, the scope and organization of the courses were somewhat changed to place more emphasis on professional training such as dietetics, institutional management, and teaching. Also included for the first time were three courses intended primarily for graduate students (8).

The following year, the Department was subdivided into four distinct categories: 1) the basic curriculum for professional home economists; 2) home economics education; 3) institutional management; and 4) extension work.

In 1921, the Department and courses were divided into definite divisions: textiles, clothing and design; food and nutrition; home management; institutional management; general; and graduate (9).

By 1925, 41 courses were offered in home economics, including a new area of study—child care and training (10).

Fedde - A Woman of Vision

In 1927, Margaret Fedde (Home Economics Chairman from 1919 to 1950), envisioned some changes over the horizon and provided leadership to move them toward reality. In an interview for the *Cornhusker Countryman*, she expressed the hope that "work in child development which includes the nursery school will have not one room . . . loaned . . . by the agricultural engineering department, but a whole building where the children can have more of a home atmosphere and where space may be provided for research in child

A home economics foods class in about 1912. At that time, food and nutrition (then called household science) was one of three main areas of study. The others were household arts (predecessor to textiles, clothing and design) and household administration (predecessor to home management).

development" (17). (See Child Development Laboratory in this chapter.)

She hoped for a "Commons" building "on this campus that will adequately house the cafeteria and at the same time offer facilities for small and large luncheons and dinners. This will offer an excellent opportunity to develop the courses in institutional management." The East Union, completed in 1977, is such a building.

"It is also my wish," she said, "that adequate space and time may be provided for the study of household equipment similar to that now provided for the study of farm equipment." Although most equipment research came later, limited research was underway in 1925.

In 1928, the Department was training students for vocations in seven professions: vocational education, general teaching, food and nutrition, institutional management, textiles and clothing and related art, extension work and social work. The emphasis of all the home economics courses was constantly broadening, "including human relationships rather than mere skills such as sewing and cooking" (11).

In 1930, Home Economics offered a course for men titled "A Man's Problems in the Modern Home." Lectures were devoted to the house (site, payments, and furnishings); clothing selection and a study of textiles; budget, savings and investments; health (considered from the standpoints of food, its qualities and selection, and psychological aspects); and child development and social problems of the family.

In explaining the new course, Fedde said "One of the failings of the modern home is the lack of cooperation between the contracting parties. Problems of managing the home are too often misunderstood by both parties". She said 98 percent of men but only 85 percent of women get married. "Men should know how to solve problems of the home—and here is their chance" (30).

By 1945, after a period of expansion and reorganization, a student could choose from among 11 majors.

When the Department of Home Economics celebrated its 50th Anniversary in April of 1949, it was serving 600 students compared with the 11 who first registered in Bouton's School of Domestic Science. About half of the 600 were home economics majors, while the other half had elected one or more courses in the Department.

Growth in programs and facilities was equally impressive, but progress in the next 25 years was even more dramatic. Much of it was envisioned by Margaret Fedde, chairman in 1949[5], although she stated her visions as hopes rather than prophecies.

"Perhaps first among my hopes," she said in a talk at the anniversary celebration, "is that in the not too distant future the structural organization of our department may be changed so that we may become a school or college of home economics—no longer a minor part of the College of Agriculture but existing on a par with it and with the colleges of arts and sciences, engineering, and all the others" (12).

Some Hopes Realized

By 1970 both of these hopes had been realized and home economics had gained significantly in academic stature and prestige. Four other administrators were involved in one way or another in progress that culminated, first, in the creation of a School of Home Economics and finally a College of Home Economics.

Two were chairmen of the Department of Home Economics—Doretta Schlaphoff (1950-1954) and Florence McKinney (1954-1962)[6].

In 1962, the Board of Regents recommended that the Department be reorganized as a School, effective July 1, 1962 (4). The School comprised five departments: Family Economics and Management; Food and Nutrition; Home Economics Education; Human Development and the Family; and Textiles, Clothing and Design.

First director (acting) of the School was Hazel Fox (1962-1963). She was followed by Virginia Y. Trotter (1963-1970).

In 1963, the Nebraska Legislature passed LB 421 which changed the name of the College of Agriculture to the College of Agriculture and Home Economics (effective in 1964), and in 1969 the Legislature established a separate College of Home Economics, effective July 1, 1970 (LB 992).

Trotter became the first dean of the new College, and continued as dean until 1972, when she was appointed vice chancellor for academic affairs of the University of Nebraska - Lincoln.

Teaching Separated from Agriculture

When the College of Home Economics was established in 1970, all teaching was separated from Agriculture. A limited number of faculty had joint appointments between Home Economics and the Agricultural Experiment Station of the IANR. The Home Economics Cooperative Extension faculty continued to be housed with the appropriate departments with responsibility to the department chairmen and the director of Cooperative Extension.

Dean Elvin Frolik did not resist the gradual separation of Home Economics from the College of Agriculture. On the contrary, he provided strong support

[5]After her retirement in 1950, Margaret Fedde spent 10 years teaching and lecturing in foreign countries. She died in Lincoln October 5, 1978 at the age of 94 (7).

[6]In 1954 Schlaphoff (then Doretta Hoffman) became Dean of the College of Home Economics at Kansas State University. She died in 1975.

McKinney resigned in 1962 to join the staff of the College of Home Economics at Oklahoma State University. Now retired, she resides in Manhattan, KS.

as Home Economics moved toward greater recognition and visibility within and outside the University. He played an active role in the establishment of the School of Home Economics, then in the change of the College name from Agriculture to Agriculture and Home Economics, and finally in the formation of a separate College of Home Economics (22).

There were other highlights in the years before Home Economics became a College. In 1962, a nutrition interdepartmental PhD program was authorized.

A home economics teaching center was completed on the City Campus in 1964. This was a limited laboratory facility in Raymond Hall to introduce home economics to nonmajors.

In 1965, the Graduate College approved a textiles, clothing and design study tour for graduate credit. The plan provided alternate years of European market study and American market study.

A Health, Education and Welfare grant was awarded to the School in 1966 to help in establishing a graduate program to prepare students to work with physically disabled persons. This program was set up within the Department of Family Economics and Management. With further financial assistance from the Nebraska Heart Association, a mobile demonstration motor coach, "Homemaking Unlimited," was designed and built as a teaching unit to be used throughout the state.

In 1967, the Graduate College approved a Graduate Council recommendation that the Department of Food and Nutrition and the Department of Human Development and the Family each be authorized to offer a program leading to the master's degree.

Hazel Anthony, chairman of the Department of Home Economics Education, and later associate dean, followed Virginia Trotter as dean of the College in 1972. Anthony effectively continued the fight against stereotypes about a college that once was seen solely as a place to prepare home economics teachers or train well-mannered young ladies to cook and sew (18).

Among other stereotypes put to rest was that a home economics student is necessarily a woman. Male graduates in home econoimcs include interior designers, merchandisers, teachers and others.

Anthony resisted proposals to place the College of Home Economics into the IANR, insisting this "would be a step backward . . . toward the old narrow definitions of the roles of the sexes" (18).

In a 1984 interview she said the College of Home Economics "today has little to do with agriculture . . . It has more interdisciplinary programs with Business Administration, Teachers College, Journalism, Arts and Sciences and other units than most UNL colleges" (18).

During Anthony's tenure[7], course offerings were broadened to include the environment, the family, independent living for the handicapped, communications, nutrition, early childhood education, and fashion merchandising and design — for men and women (18).

Although enrollment in home economics fell as other careers opened up for women, the College consistently ranked in the "top ten" nationally in undergraduate enrollment for a number of years.

Before Home Economics became a College in 1970, it had awarded a total of 203 master's degrees.

The teaching staff in Home Economics (some of whom were also part time on AES appointments) who served for at least 25 years were: Angeline Anderson, Hazel Anthony, Arnold E. Baragar, Lorraine Brandt, Margaret Fedde, Hazel M. Fox, Ruth (Jones) Ganshorn, Mary E. Guthrie, Mary (Hosier) Hall, Melinda Holcombe, Evelyn J. Metzger, Grace M. Morton, Matilda Peters, Carolyn Ruby, Lois O. Schwab, Ruth Staples, Bess Steele, and Helen Sulek.

Student Clubs

A **Home Economics Club** was organized in 1916 to promote a greater interest in home economics on the campus and among its members, as well as their social and intellectual development.

The 1924 *Cornhusker* described the club as very active, with interests that reached beyond the Agricultural Campus. "Last spring the club endeavored to make its department known throughout the state by having the girls give talks in their home schools during spring vacation," according to the *Cornhusker* (34).

In the fall of 1922, the club pledged $100 for the stadium fund (Memorial Stadium to be built on City Campus) and in the spring of 1923 raised the money by sponsoring an Easter bazaar. In 1924 the club held a spring party to help arouse enthusiasm for Farmers Fair.

Later the club became a student affiliate of the **American Home Economics Association** and remains so today. The student chapter promotes the AHEA program of work, and participates in the Nebraska Home Economics Association's fall workshop and spring convention (35).

Omicron Nu is a national home economics honor society which promotes scholarship, leadership and research. Nebraska's Zeta chapter—chartered in 1914—works with such events as Graduate Night and Career Day. It also sponsors a sophomore recognition dessert and an Omicron Nu Outstanding Alum award.

The Zeta Alumnae Chapter—one of only three in the United States —was chartered in 1923. It has several joint activities with the active chapter (35).

Phi Upsilon Omicron is a professional honorary for home economics students. It promotes the scholastic and professional development of its members and seeks to advance the profession of home economics (35).

The **Home Economics Education Association** is a

[7]Anthony retired in 1986 after 23 years as a home economics faculty member, 14 of those as dean.

professional organization for home economics students majoring in either education or extension. Programs include demonstration techniques, F.H.A., job interviews, first-year teaching experiences, and the legal aspects of teaching (35).

The **Home Economics Student Advisory Board** acts as a liaison committee between the students and the dean and faculty of the College. The Board is made up of representatives from each department (35).

Regularly enrolled students who have an interest in food and nutrition are eligible for membership in the **Student Dietetic and Restaurant Managers Association**, which encourages and fosters professional and educational goals and interests in affiliation with the Nebraska Dietetic Association (36).

The **Design Club** promotes professional opportunities in merchandising and design of fashion and textiles. Students who major in textiles, clothing and design or who have creative work experience are eligible for membership. The Design Club is a successor to Montage, a student club organized in the 1960's (37).

The student chapter of the **American Society of Interior Designers** is a professional organization for home economics students interested in this discipline. Organized at the University of Nebraska in 1970 as the student chapter of the National Society of Interior Designers, its name was changed when the two professional societies, NSID and ASID, merged (37).

The **Consumer Affairs Majors (CAM) Club** stimulates awareness of current consumer issues and improves understanding of the role of the consumer. Informal programs are presented by members and/or community resource people at monthly meetings. CAM is open to any student interested in consumer affairs (38).

Buildings and Facilities

The first classes in home economics (domestic science) were held in a room equipped with cupboards, a sink, table and stove. The room was considered entirely inadequate by Rosa Bouton, the sole instructor. As early as 1901, she stressed the need for expanded facilities (21).

The Woman's Building (Home Economics)

In 1905, the Legislature appropriated $32,000 for a building for the School of Domestic Science, called the Woman's Building, to be built on the "Farm" Campus. It was completed in the fall of 1908 and occupied by the School in January 1909 (14). Total cost including laboratory equipment was $66,150.

The Woman's Building was a three-story structure. On the first floor were offices, reception room, food laboratories, practice dining room and kitchen. The second floor and part of the third were used for bedrooms, parlors and bathrooms. Girls enrolled in the School of Domestic Science (and later Home Economics) lived on the third floor—two in each bedroom (20). Also on the third floor were laboratories for domestic art classes (21).

When Margaret Fedde joined the faculty in 1911, she moved into the dormitory on second floor. The first floor dining room was available to anyone on campus or the surrounding area to get the "best meal in Lincoln".

Pressures by larger classes necessitated changes in the building in 1912, primarily the addition of more laboratory space. There were still other changes in space and use in 1920, 1922, and 1925, gradually phasing out the dormitory and bedrooms and making more room for laboratory and faculty offices.

Equipment research, housing and equipment classes, and nutrition research were first housed on the Agricultural Campus in Machinery Hall. They remained there until after World War II when equipment research was moved to the Home Economics Building and nutrition research to the Food and Nutrition Building.

Food and Nutrition

The Food and Nutrition Building, constructed with funds appropriated by the 1941 legislature and completed in 1943, was planned to house a cafeteria, kitchen and dining rooms, food and nutrition laboratories, classrooms and research facilities, Vocational Homemaking Education, and office space. However, home economics was not the building's first occupant. The U.S. government needed it as a dormitory-classroom building for STAR, a special military training program.

The building finally became available for Home Economics in 1945. It remained basically the same until 1974, when the Legislature appropriated $700,000 for major remodeling.

New Home Economics Building

The first Home Economics Building was razed in 1973 and a new one built in its place—but only after a good deal of effort on the part of various persons and organizations.

Virginia Trotter, director of the School of Home Economics, pointed out, forcefully, the need for a new building. She had powerful support from Senator Fern Hubbard Orme in the Legislature.

A *Lincoln Star* editorial said, "The present building is a shambles, a fire hazard and woefully small," adding that it was built "many years ago to handle a student body of 40 as compared to the 1,000 now enrolled" (23), (24). State Fire Marshal Don Venter informed Senator Orme that "structural damage caused by termites . . . could result in condemnation of the structure" (26).

Senator Orme personally escorted a group of legislators through the building to observe its condition,

This baby gets lots of loving attention from student "mothers" at the Starr Street home management house in about 1948. Standing at right is Lois Opper, now Dr. Lois Schwab, who was resident adviser at the house. Babies were also an important part of life at the R Street home management house.

including the termite riddled timbers in the basement (22).

According to legend, the appropriation for the first Home Economics Building was made by the Legislature in 1907 "because the daughter of one of the Regents was struck by falling plaster during a home economics class in the Mechanic Arts Building" (12, p 3)[8].

Marcia Kominsky (Wallen), chairman of the Home Economics Student Advisory Board, led student efforts to get the project approved.

Finally the necessary appropriation was received by the University and the building was completed in 1974 at a cost of $1,634,400. (See also Part XI, Chapter 6.)

Child Development Laboratory

During the summer of 1925, a design laboratory on the second floor of the Home Economics Building was transformed into a nursery school. This marked the beginning of the child development program. In the fall of 1926, a course in "child care and training" was introduced into the regular home economics curriculum and the nursery school became an integral part of that course.

[8]It may have been fortuitous that many years later when legislative approval and financing were being sought for construction of the present Home Economics Building, "the plaster from the ceiling fell down . . . in the office of John C. Woodward, then chairman of human development and the family" (27).

Lacking a permanent home, the nursery school was located in a converted classroom on the second floor of the Agricultural Engineering Building. In November of 1928, the nursery school moved into a two-story frame house just north and east of the present site of the Nebraska Center for Continuing Education.

Especially designed as a child development laboratory, the house served this purpose until—like the Home Economics Building—it became riddled with termites and was considered unsafe. It was razed in 1969 and replaced with a one-story brick structure north of the College Activities Building (29).

The new facility was dedicated in June of 1970 as the Ruth Staples Child Development Laboratory. Staples, who had been instrumental in bringing the child care and development program into the home economics curriculum and in the initial planning of the laboratory, served as laboratory director from 1930 until her retirement in 1956.

Home Management Houses

Home management practice started in a few rooms in the Home Economics Building. In 1915, the first "practice" cottage was opened under the direction of Maud Wilson. Here students practiced what they knew about cleaning, cooking, meal planning and organizing housework. The cottage functioned briefly and then closed until 1918, when the Smith-Hughes Act was passed and home management house experience was required of all home economics women with vocational education majors.

In October 1918, a house at 2985 Holdrege was rented for home management practice, but in 1920 the program was moved to a ten-room house at 1234 R Street—this one owned by the University. Marie Fuller, in charge until 1922, was succeeded by Ruth Staples. In 1934, home management was moved to 1600 R Street. After classes became too large for one house, the Gramlich house at 3220 Starr was rented in 1938, and Margaret Liston became head of the home management division. The University bought the Starr Street house in 1945 for $7,124.

The house at 1600 R Street operated on a high/moderate income level and the one at 3220 Starr on a low/moderate income level, providing two different kinds of living experience. In 1949 daily cost of food at the higher level was 60-66 cents, and at the lower level 45-51 cents (31).

Babies were an important part of life at the home management houses. "Borrowed" from the State Home for Children (Whitehall), the babies received an abundance of love and individual attention from their student "surrogate mothers", and the students learned first-hand about child care.

Bobbie was the first baby to move into the house at 1234 R Street (in 1920), followed in the next five years by Kathryn Marie, Mary Alice, Betty Lee and Jean. Jean was only two months old when she arrived (39).

Each baby stayed about four months before adoption.

The last babies lived at the Starr Street house, including the very last baby—a black girl named Shannon.

One baby at the "R" Street house, Ronald, was not borrowed but lived there with his parents, Mr. and Mrs. Kendall Schwab who were resident advisors at the house. Born in 1952, Ronald was cared for at least part of the time by the students. He is now Dr. Ronald O. Schwab, an orthopedic surgeon in Lincoln. His mother, Mrs. Kendall Scwab, is Lois Schwab, professor of Human Development and the Family in the College of Home Economics.

In a sense, the baby care program helped promote racial understanding in Nebraska. Lois Schwab recalls that when faculty members took a black baby from one of the home management houses to an off-campus location, for example a physician's office, they aroused unusual curiosity from Lincoln people. As time went by, the trips ceased to attract attention.

In 1964, two new home management laboratories were built on the East Campus, west of Agricultural Hall, to replace the first two. These were used for the home management program until 1979. One is now used by the Department of Textiles, Clothing and Design as a design studio. The other has been renovated for use as a home economics rehabilitation laboratory (32).

Cooperative Residence Halls

Beginning in the 1930's, the Home Economics Department, and now the College of Home Economics, had under its supervision two cooperative residence halls. The first was organized in the fall of 1937 and named for Alice Loomis. Loomis Hall was at 1411 No. 37th Street and was rented from E. H. Burr, brother of Dean W. W. Burr (40). It housed 14 girls and their house mother. The girls, all College of Agriculture students, were chosen by a faculty committee on the basis of scholarship, character and financial need. They managed the house and did all of the work with the exception of the noon and evening meals, which were prepared by a professional cook (41).

In July of 1940, the Department received a gift of $45,000 from Don Love, former Lincoln mayor and prominent businessman, for construction of Love Memorial Hall, west of Agricultural Hall. In Love Hall, home economics majors planned and prepared their own meals and took responsibility for cleaning and hosting.

In 1943 and 1944, some informal hosting benefited

Home economics students examine a multi-motor washer in a home management class in 1917. This advertisement, mounted on a piece of cardboard, was found by Alan Henning, formerly of Lincoln, in a Manhattan (New York City) flea market. The ad appeared in the Saturday Evening Post on March 24, 1917. (Courtesy of the Maytag Company.)

young men in the Army STAR Unit. The soldiers, who lived in the Food and Nutrition Building, were frequent visitors to the 48 young women in Love Hall. On some weekends, hour dances were arranged for them. The STAR Unit men were on the campus at a good time. In 1943-44, enrollment of men in the College of Agriculture dropped to 48. The soldiers remained on the campus only long enough to be classified for reassignment, so few if any lasting relationships developed with the women in Love Hall. (See also Part VIII, Chapter 6.)

Women majoring in agriculture can now live in the Hall. It is now supervised by the Office of University Housing rather than the College of Home Economics.

Research

The Early Years

The first report of research in home economics is found in the Agricultural Experiment Station report for fiscal 1925 (42, Feb 1, 1926, p 21). The first project had to do with the amount of water used and labor expended in carrying water into and out of the house where modern water supply was not available. In the second project, studies were made on lamps in farm homes where electric or gas lights were not used. No home economist was included in the listing of "The Working Staff" in either fiscal 1925 or 1926.

In addition to the two initial projects, two were added in fiscal 1926, one having to do with kitchen arrangements and the other with kerosene cooking stoves (42, Feb 1, 1927, p 22).

The research continued along the same lines during fiscal 1927, but in addition two home economists were included in the list of "The Working Staff". These were Greta Gray, associate home economist (one of only nine PhD's listed on the entire Station staff), and Edna B. Snyder, assistant in home economics (42, Feb 1, 1928, pp 3 & 22).

Gray resigned effective September 1, 1928 and was replaced by Marjorie Ruth Clark on the same date. Research was expanded during fiscal 1928 to include studies on 1) water carried for household purposes, 2) lighting with portable lamps, and 3) routine and seasonal work of the housekeeper (42, Feb 1, 1929, pp 20, 21 & 45).

By fiscal 1929 the work on lighting and kitchen arrangements had been terminated and new projects had been added on 1) cash contribution of women to farm income through dairy and poultry products, and 2) washing machines, with eight makes of washing machines being tested (42, Feb 1, 1930, pp 23-25).

In fiscal 1931 a study was undertaken on electric cooking stoves, while the researchers still continued to give attention to kerosene stoves. A study was also started on family history and standards of living of farm families (42, Feb 1, 1932, p 23). The name of Arnold E. Baragar first appeared in "The Working Staff" of the Experiment Station in fiscal 1932 (42, Feb 1, 1933, p 3).

In fiscal 1933 studies were started on cooking qualities of navy beans from various parts of the U.S. During the same year, for the first time, there was no project on kerosene stoves (42, Feb 1, 1934, p 17). Marjorie Ruth Clark resigned effective May 1934 (42, Feb 1, 1935, p 34).

Gas stoves were first mentioned in the home economics research programs in fiscal 1934. In the same year studies were started on costs of certain home cooked vs commercially prepared foods, and on stability of lard for cake making. With respect to the latter, it was found that several methods compared favorably with the use of butter (42, Feb 1, 1935, p 16).

Margaret Fedde was added to the roster of the Technical Staff (the new name for the group called "The Working Staff") in fiscal 1935. A new PhD showed up on the home economics staff in the same roster — Leland Stott, appointed effective September 1, 1935. This brought the Station staff in home economics to a total of four (42, Feb 1, 1936, pp 3-4).

Research After 1950[9]

In the late 1940's and early 1950's, Ruth Leverton conducted research to determine the requirements for essential amino acids in the human diet. Between 1954 and 1960, Hellen Linkswiler continued to build on the Department's reputation in human nutrition with studies on the availability of amino acids from a number of foods, especially corn.

In the '60's, Hazel Fox and Constance Kies studied the limiting amino acids in cereal proteins, and the human requirements for pantothenic acid, one of the B vitamins. Their work also determined how nonessential nitrogen from natural or synthetic sources influences the essential amino acid requirements of human adults.

Some of the studies on pantothenic acid, proteins and amino acids were done with penitentiary and reformatory inmates as subjects.

In recent years Fox and Kies have redirected their attention to more practical nutritional studies of people's ordinary food intake. Their focus has been mainly on the need for, as well as interrelationships among, trace minerals in the diet. With more sophisticated instruments now available, they can measure, for example, trace amounts of calcium, magnesium, manganese, phosphorus, iron and selenium.

Nutrition studies also focus on aspects of lipid metabolism (fat and cholesterol), comparing the effects

[9]Since the College of Home Economics was established in 1970, a limited number of faculty have held joint appointments between Home Economics and the Agricultural Research Division. The dean and director of Agricultural Research works directly with department chairmen in Home Economics, just as in the College of Agriculture.

of the usual American diet with diets modified to reduce the risk of heart disease.

Other research addresses the nutritional well-being of infants, preschool children, adolescents, pregnant and lactating women and the elderly.

Researchers in the Department of Human Development and the Family have conducted studies related to their special interests. For example, Violet Kalyan-Masih researched cognitive development of preschool children with comparisons between American and Indian children. John DeFrain concerned himself with families coping with stress (accidental deaths, sudden infant deaths) and single parenting. John Woodward was a leader in researching loneliness. Dual careers were studied by Patricia Knaub. Adjusting the environment to persons with limited physical and mental capacities to help them live independently was studied by Lois Schwab over a long period of time.

The Department of Textiles, Clothing and Design has had limited appointments in the Agricultural Experiment Station but the staff's efforts have gained national recognition. Research on laundering procedures for the removal of pesticides from applicators' garments has been a joint effort by the Department of Entomology and the textiles faculty under the direction of Joan Laughlin. This work has been duplicated in other states with different pesticides. Other research has focused on clothing for the elderly and physically handicapped—both men and women. Self esteem is important to these people and clothing plays an important role in developing their self esteem and their independence. Audrey Newton developed a scale to determine self esteem.

Researchers in the Department of Consumer Science and Education (formerly Education and Family Resources) have concentrated on housing and its various components. For example, Raedene Combs researched alternatives for physically handicapped, and adjustments to solar energy and alternative types of housing related to trends in society. Quality of life in Nebraska was an interdepartmental study conducted by Florence Walker in this department with faculty in the Department of Agricultural Economics. The work focused on how decisions affecting use of income were made.

In fiscal 1974, all four departments of the College had projects in the Agricultural Experiment Station. Staff with appointments in the Station totaled 18—10 with the PhD degree, 4 with the EdD, and 4 with the MS. The staff was carrying on a total of 20 research projects, divided among the departments as follows: Education and Family Resources - 3; Food and Nutrition - 9; Human Development and the Family - 5; and Textiles, Clothing and Design - 3.

The growth of research in home economics with respect to both amount and quality is truly a success story. Research has come a long way since it started in 1925 with the two projects, one having to do with carrying water to the house from the old farm pump, and the other with lamps where electric or gas lights were not available.

It was a feeble start but a sound one. One must bear in mind that, for the most part, the living conditions of the time were not very far advanced, especially in rural areas, and science in the field of home economics was still in its early stages. Also, University resources for research were very limited. Home economists can take much pride in the fact that one of their first two Station staff members had the PhD degree, one of only nine in the entire Experiment Station at that time.

Extension[10]

The Pioneer Years

Homemakers were seeking new knowledge long before homemakers' clubs were organized. This desire for knowledge was recognized and nurtured by the land grant college system, including the University of Nebraska, when it initiated the Farmers' Institute movement.

These institutes were started in Nebraska in 1873-74. Later programs of interest to women were added. Two to three day meetings were held annually at several locations with special group meetings for women on food preparation and nutrition. University of Nebraska staff served as instructors.

The passage of state and federal legislation in 1914 established the Cooperative Extension Service which provided a formal organization and staff to "extend" education in additional ways to people not enrolled in land grant colleges.

Home economics specialists were employed by the University to travel about the state giving demonstrations on canning, soap making, making dress forms, hat making and many other subjects. These lessons were given to groups who met informally. By 1915 groups began to formalize their organizations often on a township or precinct basis. Reports show 13,300 members in 433 clubs in 1916. The first "woman agent"[11] was employed in the state to assist with the home economics extension program.

The first effort to train leaders was in 1917 with 45 training schools (two days in length). State specialists taught 2,152 leaders canning procedures. These leaders, in turn, taught 33,600 women who were members of community clubs, Farm Bureau and other groups. Many groups were also requesting study lesson materials on programs by specialists with emphasis on gardening, school lunch, health, labor saving devices, account keeping, selection of food, and clothing.

[10]The story of Home Economics Extension was written by Agnes L. Arthaud (43).

[11] Esther Warner (Kellenberger) employed in Seward County.

The Twenties

Mary Ellen Brown who became "State Leader of Women's Work" in 1921 noted that the number of women who could receive desired information was limited because funds were available to employ only a small number of home economics staff to give the lessons. So Miss Brown, always a visionary, promoted the idea that each club select two project leaders who would receive training by specialists or agents five or six times during the year. These leaders would, in turn, teach the club members.

Clubs began to use the name "project clubs" during the 1920's to distinguish themselves from "study clubs'[12] which participated in the extension educational program through lessons by mail, either by preference or because no staff were available to train leaders.

The decade of the twenties saw a steady growth in the number of clubs and members with almost 15,000 women enrolled in 1930 in 675 project clubs and 167 study clubs.

Coordinated efforts of agricultural engineering and home management specialists were directed to home improvement. Few farm homes had indoor plumbing. Plans were developed for installation of small pumps in kitchen sinks and building farm septic tanks.

In the early 1930's county program development committees, called home economics committees, were formed in some counties and included a county chairman, group chairmen, women on the county Farm Bureau Board and other key women. The club program was given a boost in 1935 when special federal appropriations made it possible to employ ten additional home demonstration agents, bringing the total county home economics staff to 24 with six state specialists employed to give leadership in subject matter areas.

[12]Two types of clubs continued to exist until 1945 when all clubs were given the designation of Home Extension Clubs and urged to build their year's programs on a combination of available leaders training lessons and study lessons.

County Home Extension Council chairmen played a key role in the home extension club program. Here Agnes Arthaud, state home extension leader from 1957 to 1974, presents a chairman with a leadership pin.

Hard Times in the Thirties

The increase in staff made it possible to reach homemakers not in clubs as well as project club members. "Live at Home" programs were stressed to help people adjust to hard times brought on by drought and depression. Home gardening, food preservation, butchering, and raising chickens were given top priority. Home sewing, repair and adjustment of sewing machines, and making clothing and home furnishings from cotton flour sacks and feed bags were popular projects. Home recreation was also given attention with workshops on making games, children's toys and gifts. Mothers' vacation camps were held at several locations in the state during the 1930's to help raise morale during the depressing times.

Keeping records of family living expenditures was encouraged. Home account books were analyzed by home management staff and information was supplied to families to assist them in making changes in spending patterns.

In 1939 over 7,500 of the 29,000 project club members reported using information from project club demonstrations as a basis for readjustments in family living.

By 1936 membership in project clubs had increased to 26,600. At the urging of Mary Ellen Brown, the Home Economics Section of Organized Agriculture authorized its president to appoint a committee of nine to make plans for a state organization of home demonstration clubs. This committee met in February 1936 and initiated plans to sponsor a delegation to attend the triennial conference of the Associated Country Women of the World to be held in Washington D. C.

As a result of this conference, the Nebraska Council of Home Extension Clubs[13] was formed. The organization has blended the knowledge and talents of lay leaders with those of professional staff to strengthen the club program and develop leadership. Leaders have expanded their interests to include, in addition to home economics programs, emphasis on community development, safety, cultural arts, education and citizenship.

The 1940's brought new enthusiasm to Nebraska families. Drought was tapering off, farm income increasing and rural electrification lines were being built.

[13]The original constitution adopted in January 1937, refers to the organization as "The Nebraska Homemakers Council". It later became the Home Demonstration Council and a constitution change adopted in 1974 changed the name to the Nebraska Council of Home Extension Clubs.

Home economics and agricultural engineering extension specialists and county extension agents conducted house remodeling workshops and kitchen clinics and assisted with plans for running water, sewage disposal and electrifying farm and home buildings.

WW II and the Latter Forties

Just when things were looking up, World War II broke out and extension programs gave priority to food for defense and adjustment to shortages of goods and labor. Records show community meetings were held all over the state to teach ways of meeting shortages of meat, sugar and other consumer goods. Extension staff and lay leaders went from house to house in town and country promoting an aggressive gardening program. Meetings, home visits, radio, press and publications were used to teach gardening and food preservation. Pressure canner gauge testing equipment was set up in each county extension office.

Early in the 1940's the USDA's Cooperative Extension Service, the Surplus Commodity Administration and the Agricultural Adjustment Administration launched a mattress making campaign. It had the dual purpose of reducing the cotton surplus in the South and assisting economically disadvantaged families. Even though all Nebraska county extension agents in agriculture and home economics, and some lay leaders, were given training in the process, the project was not very popular in Nebraska. Mattress making centers were set up in only a few counties. Reports show 21,000 mattresses were made in 1940-41.

Project club enrollments dropped about 30 percent during the war years because of gas and tire rationing. The increase in the number of women employed outside the home, or assisting with farm work to ease the labor shortage, was also a factor.

Florence Atwood became state Home Extension leader at the retirement of Mary Ellen Brown in 1945. Atwood initiated several organizational changes in clubs. Project and study clubs were merged and renamed Home Extension Clubs. Membership increased 25 percent in the five post-war years to 25,000 in late 1949.

Increased emphasis was given to special interest meetings where direct teaching was done by county agents for specific audiences. Attendance included nonclub members as well as club members. Agents continued to hold training sessions for leaders of home extension and other women's clubs. These leaders then presented programs at the club meetings.

Materials again became available for rural electrification and home improvements. Many of the extension programs provided information on use of electricity and improvement of housing.

Home economists and agriculturists cooperated in a Farm and Home Development program. Community groups were formed with young farm couples as members. Many of the participants were veterans returning to the farm at the end of the war. Groups met regularly with agents to discuss and develop plans for more effective use of resources for farm and family living.

New Programs for the Fifties

The decade of the 50's was relatively free from pressures of war. The economic climate was favorable for progress. Homemakers' requests for programs reflected the desire for change and relaxed living. Educational programs were given on deep fat frying, broiler meals, selecting and using electric housewares, lighting fixtures and home furnishings. Women were eager to receive information to assist them in purchasing, sewing, and caring for clothing and furnishings made from the many new "man made" fabrics.

The building boom continued and many workshops were held on planning or remodeling bathrooms, kitchens and utility rooms.

Home extension club enrollment reached 34,000 in 1956. Club programs reflected the fact that women's interests had broadened. Lessons were provided, with the assistance of other agencies or university departments, on such topics as the Nebraska tax situation and on Nebraska's schools.

Efforts were made to involve a larger segment of the population in determining educational needs of families as the basis for home economics extension programs. District meetings were held in 1956-57 and designated as a "forward look" to discuss long range program needs and goals. Attendance included both home extension club representatives and community leaders.

The Turbulent Sixties

The decade of the 60's reflected turbulent times with concerns about nuclear fallout, campus riots, struggle by minorities for acceptance and increasing inflation. Home economics extension programs reflected these trends in various ways. Cooperation with other agencies was sought to provide programs on civil defense, farm and home safety, use of drugs and narcotics and understanding other cultures. A family life television series cosponsored and financed by the Cooperative Extension Service and the Nebraska Council of Home Extension Clubs focused on parent/teenager communication. Groups were organized to view and discuss the content.

Even though more women were employed outside the home, home extension club enrollment peaked at 35,000 in 1963 with 46 percent living in towns or urban areas. The number living on farms decreased 10 percent between 1953 and 1963. Lessons included such topics as "quick and easy meals", "versatile small appliances", "wise consumer shopping", and "family financial records".

A 20 percent increase in the home economics field

staff between 1965 and 1975 made it possible for nearly all Nebraska counties to have access to the competencies of county or area extension home agents. It was also possible to reach a more diversified clientele and to use a greater variety of teaching methods. Programs were provided at low-income housing projects, and at senior citizen and other community centers. "Lunch and learn" sessions were held at some industrial plants. Home economics subject matter was taught at a series of meetings rather than being limited to one-day sessions.

A federal grant in 1968 made it possible to initiate an expanded nutrition program. Paraprofessionals, supervised by home economists, were employed to work directly with financially disadvantaged families to teach nutrition, food preparation and sanitation. The program expanded from the three pilot counties set up in 1968 to 24 counties in 1971 where approximately 50 percent of Nebraska's poor lived.

A Family Life Specialist — Finally

Over 40 years of planning, pleading, and plotting on the part of Home Economics leadership culminated in the 1973 appointment of Ronald T. Daly as Nebraska's first extension specialist in family life. Mary Ellen Brown, state home demonstration leader, developed plans for a program and made the first formal request in 1930 for funds for the position. The request was repeated regularly thereafter.

Several hundred women attending the 1937 meeting of the Nebraska Home Demonstration Council passed a resolution requesting Extension and College administrators to include a position in their budget requests for a specialist to develop a program on child training and family relationships. Low priority was consistently placed on the position by Extension and University administrators and by the Legislature as budgets were developed and approved.

It was with some reluctance in 1973 that Department Chairman John Woodward and Assistant Extension Director Agnes Arthaud decided to resort to a "trade off" of the vacant position of health education specialist for a position in family life. The request was approved. The decision proved to be a valid one. The requests for assistance from county staff and organizations were so numerous that one specialist had difficulty meeting the demands for conferences, publications and assistance with planning programs.

Emphasis on Health

The void in the health education program was noted by extension leaders and clientele. The Nebraska Cooperative Extension Service had a long history of working with leaders and organizations to improve the health situation in rural Nebraska. Health specialists were included on the staff from 1922. The Great Plains Health Council recognized this support of a health program in Nebraska and funded a health study program in the state. A health specialist, Elin Anderson, was in charge and worked closely with Cooperative Extension on a pilot program in Nebraska from 1939 to 1944. Extension positions were maintained until the retirement of Helen Becker in 1971.

It was possible to resume the health emphasis in 1974 when the job description for the vacant homemaker rehabilitation specialist position was broadened and renamed "human development". Leon Rottman was employed to fill the position and given the responsibility of working closely with health agencies and the University of Nebraska Medical Center in providing programs related to health for individuals, including handicapped, elderly and special needs.

Home computers became a channel for teaching home economics in the 70's. "Dietcheck", offered on AGNET, was and still is one of the most popular programs. A program called "House" was designed to give home owners specific information on the use of energy in the home. Home economists joined agriculturists in developing other programs on energy. Exhibits were prepared, slide tapes developed, and meetings and fairs held in cooperation with other agencies. Home economists wrote a series of publications with such titles as: *Energy Choices in the Kitchen, Winning Ways with Water, Be Aware of What You Wear, Easy on Energy - with Appliances* and others.

Home extension clubs, which for many homemakers was their first association with Cooperative Extension in the early 20's, continued to flourish in Nebraska 50 years later with a membership in 1979 of 26,722 enrolled in 2,029 clubs.

Members of the state CES Home Economics staff who served for 25 years or more were: Agnes L. Arthaud, Florence J. Atwood, Helen L. Becker, Ethel Diedrichsen, Clara N. Leopold, Gerda Petersen, Magdalene Pfister, Helen A. Rocke, Anna Marie (Kriefels) White, Allegra Wilkens, Janet M. Wilson, D. Eula Wintermote.

Major Honors and Offices

Staff

Recipient of honorary doctorate degrees

Virginia Y. Trotter received five honorary doctorate degrees, including:

Kansas State University	1975
Lincoln University (San Francisco)	1975
Milton College (Milton, Wisconsin)	1975

Appointed UNL Regents Professor

Hazel Fox	1968

Recipients of UNL Distinguished Teaching Award (after 1970 includes only staff with joint appointments in the IANR)

Hazel M. Anthony	1968
Audrey Newton	1970

Jacqueline Voss	1973
Melinda Holcombe	1976

Presidents of National Professional Organizations

American Home Economics Association

Gwendolyn Newkirk	1975-1976

American Home Economics Association Foundation

Gwendolyn Newkirk	1982-1983

National Association of Home Economics Teacher Education of the American Vocational Assocation

Hazel Anthony	1963
Melinda Holcombe	1966

Served as Assistant Secretary for Education, Department of Health, Education and Welfare

Virginia Y. Trotter	1974-1977

Alumni

Recipients of honorary doctorate degrees

Awarded by the University of Nebraska

Ruth M. Leverton	1961
Georgian Adams	1964
Doretta (Hoffman) Schlaphoff	1966
Henrietta (Fleck) Houghton	1970

Awarded by Kansas State University

Doretta (Hoffman) Schlaphoff	1966

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Chapter 15. Horticulture and Forestry[1]

Contents

Section A. The Department at Lincoln

Contents

Names of Administrative Unit

Horticulture	ca 1881-1885 (3)	Department of Horticulture & Forestry	1959-1974
Botany and Horticulture	1885-1892	Department of Horticulture	1974-present
Department of Horticulture	1892-1959		

Headquarters Location

Records are incomplete as to where Horticulture was located in the early years. It has been noted that the discipline (Department) was headquartered in a building in 1903, which structure was later used by agricultural engineering, then for a storeroom, and finally razed in the fall of 1928 (4). The January 1909 issue of *Agriculture* (5) contained a photograph of a building entitled "Horticultural Building" which was constructed in 1904. It was a two-story frame building with two fairly large greenhouses attached, located approximately where the Plant Industry Building now stands.

Horticulture was one of four departments headquartered in Plant Industry Hall from the time it was built until 1978. Since 1978, the Department of Horticulture has been one of three departments (Agronomy only partially) located in the Plant Science Hall.

Administrators

Name	Title	Years Served
Harvey Culbertson (1, p 89)	Professor	ca 1881-1884
Charles E. Bessey (1, p 47)	Chair, Botany and Horticulture	1884-1891
F. W. Taylor (1, p 87)	Professor	1891-1893
Fred W. Card (1, p 87, 2 p 89)	Associate Professor	1893-1898
Charles E. Bessey (2)	Professor	1898-1899
R. A. Emerson	Head professor of Horticulture	1899-1914
R. F. Howard (3, pp 231-232)	Prof. and Head[2]	1915-1919
R. F. Howard (3, p 232)	Chairman[3]	1919-1924
C. C. Wiggans	Chairman	1924-1956
Victor J. Miller	Chairman	1956-1958

[1]The authors gratefully acknowledge the assistance of Walter T. Bagley, Roger D. Uhlinger, and J. O. Young in the preparation of this chapter.

[2]In April 1914, the Regents abolished the title of head professor, replacing it with the title of professor and department head (3, pp 231-232).

[3]In 1919 the positon of department head was abolished, and replaced by the positon of chairman. The purpose of this change was to place the policy of the department under the control of the faculty. The functions of the chairman were to preside at departmental meetings and to act as the department's official representative in administrative matters (3, p 232).

Joseph O. Young	Chairman	1958-1974
Dermot P. Coyne	Acting Chairman	10/74-6/75
Roger D. Uhlinger	Chairman	1975-1977
Roger D. Uhlinger	Head[4]	1977-1986
Paul E. Read	Head	1987-present

Early History

The first professor of Horticulture was Harvey Culbertson who had been an instructor in the agricultural department as well as being foreman of the farm. His appointment continued from about 1881 until the effective date of his resignation on September 1, 1884. That month Charles E. Bessey joined the faculty of the University of Nebraska as professor of botany and horticulture and dean of the Industrial College, retaining his responsibility in horticulture until 1891. He again accepted responsibility for horticulture for six months beginning September 1898.

Starting in 1893, Fred W. Card initiated the first significant work with vegetable crops. In 1895, R. A. Emerson joined the Department as assistant horticulturist but resigned in 1897 to accept a position in the Office of Experiment Stations in Washington. In the spring of 1899 Emerson returned to Nebraska as head professor of horticulture. He remained for 15 years during which time he conducted his historic genetic studies on beans and corn. He also studied winter hardiness with trees and began the program of potato investigations which has continued over the years. Harvey A. McComb conducted horticultural research at the North Platte Station from 1914 to 1949. An extension specialist, Ernest H. Hoppert, was added to the staff in 1915. The early 1920's found Nebraska horticulture served by an expanded and well balanced department (6).

C. C. Wiggans joined the staff in Horticulture in 1919 beginning a period of active service that lasted 37 years. For 32 of those years, he was chairman of the department. During the Wiggans administration much progress was made both in fundamental and applied research.

One of the more important developments in the Department was the breeding of vegetable crops including potatoes. Ten improved varieties of potatoes including "Progress" and two varieties of tomatoes including "Sioux" had been released by 1948, with the breeding work having been done principally by H. O. Werner.

Horticulture After 1924

Teaching

Considerable development in the curriculum took place during the period of 1959 to 1975.

The first course in agricultural climatology was offered in 1962-63 and taught by Norman J. Rosenberg. Teaching in this area has been expanded materially since that time (for further information see Part V, Chapter 19).

Approximately 125 Bachelor of Science degrees were awarded in horticulture between 1974 and 1984 with only a limited number being awarded prior to that time. Prior to the 1974-75 academic year, many students in horticulture and forestry were preforestry students who transferred to the School of Forestry at Missouri rather than completing degree work at UNL. Thirty-four master's degrees and 21 doctorates have been awarded through the Department.

The University of Nebraska-Lincoln Horticulture Club, started in 1975, was chartered by the American Society for Horticultural Science in 1976. It is an undergraduate organization. Members of the Club participate actively in regional and national society affairs and have held offices at both levels.

Research and Extension

Developing an understanding of the tuberization phenomenon in potatoes, breeding improved cultivars of potatoes and tomatoes, and basic work on ventilated underground structures for long term storage of potatoes were accomplished during the 20's, 30's and 40's. Depletion of subsoil moisture under orchards was elucidated during the 1940's and early 1950's (6).

From 1958 to 1974 the horticulture part of the department saw a continued emphasis on vegetable crops breeding and physiology — potatoes and dry beans in particular, the initiation and development of a climatology component which complemented work on evaluating the potential for commercial vegetable production in Nebraska, and the initiation of a roadside beautification component which included turfgrass management and ornamental/native plant sections. The turfgrass management section proved to be the progenitor of one of the premium turfgrass science programs of the United States.

The foregoing studies provided a sound basis for expanded breeding, physiological, cultural and postharvest physiology programs in the 1970's and 1980's. National recognition accrues to the current programs in dry bean breeding, potato development, agricultural climatology, turf culture and native wildflower utilization.

A nationally recognized agricultural climatology group was started within horticulture. That group is now a separate administrative unit with the title of

[4]On December 10, 1977, in the IANR, the title of department chairman was changed once again to department head — all of which lends credence to the adage that "The more things change, the more they stay the same".

Center for Agricultural Meteorology and Climatology[5] (11).

Between 1960 and 1984, horticulture staff members at Lincoln and at the district stations (now Centers) released the following numbers of cultivars (varieties): woody ornamentals - 6; domestic and wild flowers - 48; and vegetables - 11.

In 1958 Joseph O. Young replaced Victor J. Miller as department chairman. Young with a doctor's degree in botany from the University of Chicago, and having served as head of the agricultural research department of Libby, McNeil and Libby, represented a major change in background from previous chairmen. Young embarked immediately upon a major program to develop the vegetable production potential of the state.

In his efforts, Young had the strong backing of Dean W. V. Lambert, who in February 1959 stated: "The state's economy could get a boost of $100 million by growing and preparing vegetables for the canning industry . . . This could be accomplished by devoting just 5 percent of our irrigated land to vegetable production" (11). The Dean appointed a canning crop committee which proposed this three-phase approach to the projected program: 1) growing plots of vegetables over the state to provide data for determining the potential on a commercial scale; 2) conduct detailed experiments on cropping practices; and 3) interpretation of Nebraska's resources for vegetable production (12, 13). This program was endorsed by 75 Nebraska business and agricultural leaders (13).

Funds were raised privately, primarily in Platte, Hall, Buffalo and Dawson counties and in the South Platte areas, to activate phase 1 of the program. At about the same time efforts were made by interested persons over the state to get additional funds under LB 722, passed by the 1959 Legislature to provide research and development funds for the industrial utilization of farm products. This latter program was under the State Department of Agriculture with Pearle F. Finigan as Director (14). Finigan questioned the legality of using LB 722 funds for the University vegetable program.

Meanwhile hopes for commercial vegetable production in Nebraska continued. Staff member Jerry Warren in 1960 (15), and Young in 1961 (16) expressed considerable optimism for commercial vegetable production in Nebraska.

In September 1961 the Regents accepted a $134,600 grant from the State Department of Agriculture for vegetable research. As a part of the program Norman Rosenberg was hired by the University as agroclimatologist. Research had been extended with plots at Scottsbluff, Alliance and Mirage Flats (17).

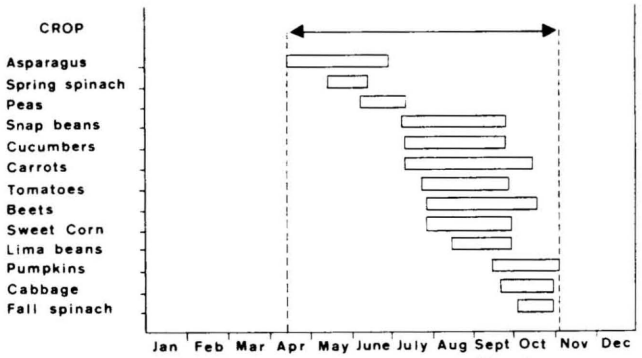
Governor Frank Morrison asked the University to include necessary financial support for vegetable research since he did not feel such funds should be channeled through the State Department of Agriculture. Accordingly, the Regents asked for a special appropriation of $144,500 for vegetable research for the 1963-65 biennium.

[5]For further information on research in this area see Part V, Chapter 19.

Funds were raised privately to assist the Department of Horticulture to do research in the interest of increasing commercial vegetable production in Nebraska. Here Ralph Misko, president of the First National Bank of York when this picture was taken in 1960, presents a check to Chancellor Hardin. Others representing the University (from left) were Harry Hecht, York County extension agent, Joseph O. Young, chairman of Horticulture, and Dean Frolik.

By 1965 vegetable plots, in addition to locations mentioned above, were conducted at Sargent and Ainsworth. Young reported that ". . . Nebraska can produce tonnages of tomatoes, sweet corn and snap beans in excess of nation averages . . . Other crops showing promise . . . are onions, carrots, table beets, and potatoes for processing. Basic information about vegetable production and Nebraska climate is being provided to national concerns who are considering locating in Nebraska." Norman J. Rosenberg and Ralph E. Neild were publishing a series of climatic atlases for various portions of the state. Commercial onion processing and production of frozen french fried potatoes had become a reality (19).

In 1967 R. E. Neild, D. S. Nuland, and J. O. Young authored Station MP 18, which outlines the potential for vegetable production in Nebraska (10). Today there is published information on planting dates, harvest dates and length of season projected for a series of vegetable crops. The following chart exemplifies, in summary form, the type of information provided by this research:



Potential processing periods for a sequence of vegetables at Kearney.

Chrysanthemums in the horticulture experimental grounds on East Campus. At upper left is the orchard house north of Holdrege Street about on a line with 46th Street. Hans Burchard, retired from the University in 1973, recalls the picture was taken in about 1960 when "mum days" were drawing large crowds. Burchard worked closely with Glenn Viehmeyer in chrysanthemum breeding work.

Potato acreage in Nebraska had declined by the early 60's and continued to decline steadily thereafter. However, adoption by growers of improved production practices and new varieties resulting from research by H. O. Werner and Robert B. O'Keefe, conducted primarily in western Nebraska at the Panhandle Station and the Northwest Agricultural Laboratory, and by workers in other states, resulted in yield increases which largely offset the acreage decline. Also these researchers were instrumental in developing cultural and storage systems which resulted in the adaptation of potatoes for processing, especially chipping.

After receiving major attention in the early 60's, interest in commercial vegetable production in Nebraska waned in the latter 60's and 70's. However, with the sagging farm economy of the 80's, there is rekindled interest in these crops (see also Part VI, Chapter 4). Margo Young has reported "Lured by the possibilities of $5,000 per acre profits, local farmers are expanding from traditional vegetable crops such as dry edible beans, potatoes, and watermelons to so-called specialty crops such as onions, carrots, cabbage, lettuce, broccoli, and cucumbers . . . Ag observers blame most problems of the 1960's growers on overproduction and limited markets. To avoid the disappointments of that era, growers must stress marketing and processing . . . Nebraska climate and conditions are well suited to fruit and vegetable growing" (20).

An outstanding program of dry bean breeding has been developed by Dermot P. Coyne, assisted by plant pathologists Max L. Schuster and James R. Steadman. The release of six new cultivars (varieties) together with improved cultural practices based on research findings have made possible a steady expansion of bean production in Nebraska. The increased production has found an outlet in meeting an increasing foreign demand.

Turf research in the department was initiated by A. E. Dudeck in 1964. Dudeck resigned in 1970 and in 1974 was replaced with R. C. Shearman in 1975. The program is now one of the premier turfgrass science programs in the U.S.

Ornamental horticulture research in the department was initiated by Ronald Raven in 1957, followed

by Harold Pellett and still later by S. S. Salac.

F. G. Teubner organized and taught a course in plant physiology. After his death in 1962 the program was carried on by E. J. Kinbacher who, with postdoctoral assistants Roger D. Uhlinger and Charles Sullivan, initiated research in stress physiology.

Extending information on producing and using horticultural crops commercially and in home gardens has been a significant aspect of the Department of Horticulture activities since its beginning (6, 9 10). Wayne C. Whitney was one of the founding fathers of the still popular Backyard Farmer ETV program. Whitney worked on vegetables, fruit and ornamentals (see also Part VIII, Chapter 4). He was followed in 1975 by D. H. Steinegger who continues in that role with somewhat greater emphasis on small fruit production and direct marketing of horticultural crops.

Forestry - Research and Extension After 1924

Forestry extension has placed emphasis on the Clarke-McNary Tree Program, establishment of shelterbelts, shelterbelt influences on crop yields, and studies on snow distribution. The first extension forestry specialist was Clayton W. Watkins (1926-1940). Others appointed prior to 1975 who have served at least 10 years on the East Campus have been Ellsworth H. Benson, Karl A. Loerch, and Earl G. Maxwell. Development of fire control districts throughout the state as well as related wild fire suppression activity were significant aspects of the forestry program. Extension forestry positions were also established at the five district centers.

U.S. Forest Service personnel affiliated with the department carried out forest (shelterbelt) tree improvement programs including germplasm collection from many provenances followed by replicated trials for evaluation purposes. Noise attenuation by shelterbelts, and shelterbelt tree disease identification and control were other significant activities of the U.S. Forest Service group.

Development of field plantings and associated facilities for horticulture, climatology and plains forestry activities at the University Field Laboratory at Mead, conifer seedling production at the Bessey District of the Nebraska National Forest at Halsey, and provenance plantings at the Horning State Farm at Plattsmouth, as well as at other sites across the state were among major accomplishments of Young's administration during the 1960's and early 1970's.

In 1961, Young suggested the idea of an arboretum on a statewide basis. In promoting the concept, he was assisted by Glenn Viehmeyer of the North Platte Station. The suggested program took into account the geography, climate and population patterns of Nebraska with a view to widest possible public participation.

In 1974 a decision was made to divide horticulture and forestry into two separate administrative units. Dermot P. Coyne was appointed acting head of the horticulture component and Ellsworth H. Benson was appointed acting head of the forestry component. In the spring of 1975, the concept of a multiple site statewide arboretum for the State of Nebraska was approved by the administration of the IANR and by the Board of Regents. On July 1, 1975 Mitchell D. Ferrill was appointed head of the Department of Forestry and Roger D. Uhlinger was appointed head of the Department of Horticulture with an interim appointment as curator of the Nebraska Statewide Arboretum. From 1977 to 1980, Joseph O. Young served as curator of the Arboretum and was succeeded April 15, 1981 by George B. Briggs who currently holds the title of director, Nebraska Statewide Arboretum with the "curator" title being assigned to individuals responsible for the several sites affiliated with the Arboretum.

International Agriculture

Involvement in international agriculture programs has occurred primarily in the decades of the 1970's and 1980's. J. O. Young, chairman of Horticulture and Forestry, was assigned to the University project in Colombia, South America in 1970 and 1971 and, starting in 1974, he spent two years with the University of Nebraska at Omaha program at Kabul University in Afghanistan.

Federal Cooperation

Cooperative programs with the U.S. Forestry Service have been significant and are discussed later in this chapter in the Horning State Farm section. Additionally, members of the climatology/meteorology section of the Department of Horticulture and Forestry had and continue to have close working relationships with the National Weather Service.

Efforts of Chairman Young were responsible for the acquisition of a significant federal grant for highway beautification. That grant provided the funding necessary to initiate native plant and turfgrass research noted above.

Cooperation with Nebraska Potato Development Board

Horticulture has had close ties with the Nebraska Potato Development Board. Resources made available by that agency have significantly enhanced the productivity of the potato breeding and culture work of R. B. O'Keefe. The relationship has continued since the inception of the Potato Board in 1941.

Support from Charitable Foundations

The Herman Frasch Foundation provided funds for postdoctoral research on heat and drought resistance in vegetable crops from 1962 until 1967. Roger D. Uhlinger was the first Herman Frasch postdoctoral fellow and was followed by Charles Y. Sullivan. The

faculty members responsible for acquiring the Frasch grant were Fred G. Teubner and Edward J. Kinbacher.

Cooperating Organizations

The Nebraska Association of Nurserymen, the Nebraska Florist Society, the Lincoln Rose Society, the Nebraska Horticulture Society, Federated Garden Clubs of Nebraska, the Nebraska Nutgrowers Association and the Nebraska Turf Foundation are organizations with which horticulture has had close working relationships over the years.

Commodity groups and Horticulture faculty benefit mutually from having close working relationships. The Nebraska Bean Dealers Association, the Nebraska Dry Bean Growers, the Nebraska Onion Growers, the Nebraska Potato Council, and the Nebraska Golf Course Superintendents Association are representative commodity groups.

Departmental Impact on Nebraska Landscapes

The influence of Horticulture and Forestry activities— 1924 to the present time—on Nebraska's landscapes has been significant. Members of the Department have provided Nebraskans with information on the selection, function and value of landscape plants, planting techniques and landscape/roadside maintenance.

Roadside parks and interstate highway rest areas, Game and Parks Commission recreation areas, UNL and other campus grounds, the Nebraska Statewide Arboretum, residential landscapes, and UNL off-campus sites all exhibit the influence of Department of Horticulture and Forestry programs.

Individual Honors

Staff

Recipient of honorary doctorate degree - the University of Dublin, Ireland

Dermot P. Coyne 1980

Appointment to UNL Regents Professorship

Dermot P. Coyne 1986

Chosen by former students as having the greatest impact on their lives, in response to a request which appeared in the winter 1983 issue of the *College of Agriculture Alumni News*

C. C. Wiggans

President of a national professional or honorary society

Charles E. Bessey, American Association for the Advancement of Science 1910

H. O. Werner, Potato Association of America 1924-25

Robert B. O'Keefe, Potato Association of America 1980

Dermot P. Coyne, American Society for Horticultural Science 1984-85

Alumni

Elected to membership in the National Academy of Sciences

Warren H. "Buck" Gabelman 1977

Recipient of honorary doctorate degrees from the University of Nebraska

Henry A. Jones 1953
Warren H. "Buck" Gabelman 1976

Recipient of USDA Distinguished Service Award

Henry A. Jones 1953

President of the American Society for Horticultural Science

Warren H. "Buck" Gabelman 1977-78

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Section B. University Fruit Farm at Union

Contents

Name		Administrators
The University Fruit Farm[1] (2)	1917-1961	Operated administratively by the Department of Horticulture, Lincoln.

Land and Improvements (2)

Year Acquired	Item	Cost
1917	80 acres of land, near Union, Nebraska	$10,000 (2)
1920	Residence for foreman	$ 4,500 (3)
1920	Barn	$ 1,800 (3)
1937	Irrigation pumping plant	$ 5,000 (10)
Various dates	Machine shed, well, fences, and combined packing shed and storage cellar	(unknown)

Staff

No academic staff members were ever headquartered at the University Fruit Farm. The experimental work was conducted under the direction of various staff members of the Department of Horticulture located on the Lincoln Campus.

Background

In order to fully understand the establishment of the University Fruit Farm in 1917 and its demise in 1961, it is necessary to have some knowledge of the history of the fruit industry in Nebraska.

In the 1880's and early '90s nearly every farm in Nebraska had home orchards, some as large as five acres. In most portions of the state, although considerable quantities of fruit were harvested, primarily for home use, fruit production did not prove to be commercially feasible due to drought, winter injury and spring frost damage. The principal fruit crop in these early years was apples, the production of which reached nearly two and one-half million bushels in the period of 1905-09. Thereafter production dropped. It totaled 1,625,000 bushels in 1917 and less than three quarters of a million bushels during the period of 1925-29. The reduction was attributed largely to the passing of the home orchard.

The experience gained during the early years was helpful in the establishment of commercial orchards. After 1930 these orchards were limited largely to the loess hills that ran along the Missouri River from north of Omaha, south to the Nebraska-Kansas border, with some orchards along the Platte River as far west as Kearney. By 1931 commercial fruit production was limited largely to apples, grapes and cherries. A considerable tonnage of Concord grapes was being shipped annually out of Brownville and Omaha. At about this same time planting of sour cherries was stimulated in the Nebraska City area by the establishment of a local canning factory (2).

Fruit production in Nebraska received two severe climatic setbacks. The first of these consisted of two severe droughts, the first starting in 1910 and the second one (much more severe) occurring in the early 30's (2). Major winter injury resulted from the Armistice Day freeze of 1940. The severity of the latter was due to a late fall followed by a precipitous drop in temperatures. Up until Sunday, November 10, there had been only two days at Lincoln when the minimum temperatures dropped below freezing, on November 6 to 31° and on November 7 to 32°. After a pleasant day on November 10, temperatures[2] started dropping in the evening, reaching 11° on November 11 and 7° on November 12 (4). There had been no opportunity for fruit trees to become hardened for winter—most of the trees still having a full covering of green leaves on November 10. The results to orchards were disastrous. Wiggans (2) stated that at least 60% of the trees were killed outright or badly damaged.

By 1959, commercial apple production in the state dropped to 36,000 bushels. The commercial production of grapes dropped from 2,800 tons in 1930 to 700 tons in 1947 (1) and to 4,850 pounds in 1982 (11).

[1]Often referred to as the Union Fruit Farm.

[2]The drop in temperatures (given above in Fahrenheit) was accompanied by a snow storm.

Beginning of the Fruit Farm

In 1917, commercial orcharding was a thriving industry in Nebraska, even though largely limited to a fairly restricted geographical area as discussed above. Senator W. B. Banning, a commercial orchardist at Union and a strong leader, had a great deal to do with the passage of the Legislative Act in 1917 which provided $10,000 for "The purchase of an experimental fruit farm, away from the State Farm". The Legislature obviously did not want the work to be done on or near the Lincoln campus, since this location was considered to be outside of the commercial fruit area.

The University responded promptly. In the fall of 1917, an 80 acre tract of land was purchased from H. E. Ruhmann for the exact amount of money which had been appropriated by the Legislature. The farm, located one and one-half miles south of Union, on the east side of what is now Highway 73/75, was legally described as the W 1/2 of the SW 1/4 of Section 36, Twp 10N, Rge 13E, Cass County, Nebraska (2).

The Program (2, 5, 6 and 7)

Plantings and accompanying studies were made of the following fruits: apples, cherries, plums, peaches, pears, and grapes. Plantings were also made of the following nuts: pecans, pecan-hickory hybrids, black walnuts, English walnuts, and filberts. A "home orchard" was planted to serve as a representative planting for home use. A number of species of fir and spruce were set out in 1930 to determine the possibilities for Christmas tree production. Isolation plots were made available at the farm for vegetable breeding research.

Various inter-crops consisted of red clover, permanent sod (probably Kentucky bluegrass), and soybeans as a cover crop. Another treatment consisted of clean cultivation. So much difficulty was encountered with rabbits destroying the soybeans that a change was made to sweet clover. In the clean cultivated plots, erosion was so serious that it was decided to use rye and subsequently vetch as cover crops. Manure was used but the supply was inadequate to meet the needs. Studies were begun in 1930 on the use of commercial nitrogen fertilizers.

One of the most significant areas of research had to do with soil moisture. Some irrigation facilities were installed and some of the area was terraced. Wiggans took the lead in the soil moisture studies. He published a number of papers on this research, making his final report on this subject in 1964 (7) (8 years after he was retired by the University). He utilized data not only from the University Farm but also from other orchards in the surrounding area, reporting on apple orchards, vineyards, and deciduous and white pine forests. He found, following the drought of the 30's, that moisture was depleted to a depth of 30 feet in apple orchards, and replenishment by precipitation was slow. Forty-three inches of irrigation water raised the water capacity of the soil to a depth of at least 30 feet. Vineyard moisture requirements were found to be lower than those for fruit trees.

Field days were held at the Farm. In 1954, it was reported that at such a meeting held on August 4, "While the attendance was not large, there was a healthy interest in the work underway".

The End of the Fruit Farm

On February 4, 1961, the Board of Regents approved the recommendation of Chairman Young and Dean Frolik that, subject to authorization of the Nebraska Legislature, the University Fruit Farm be sold (8). Frolik testified at a Legislative Committee hearing in 1961 in support of LB 437 which had been introduced to provide the necessary authorization for disposal of the Farm. He called attention to the severe reduction which had taken place in fruit production in Nebraska since the Farm was established in 1917. He suggested other University lands where fruit production research could be conducted, recommending that the funds could be better used in supporting research of higher priorities (1).

LB 437 was passed and the Farm was sold at auction December 1961 to B&R Corporation of Lincoln for $24,320 (9).

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Section C. The Horning State Farm at Plattsmouth[1]

Contents

Name

The name of this unit, since it came into possession of the University, has been "The Horning State Farm".

Administration

Beginning in 1950 (the first full cropping year that the University had charge of the Farm), it was handled as a part of the Development Farms by Philip A. Henderson (see Part VI, Chapter 10). At the end of 1958, the Horning State Farm was placed administratively under James Dunlap, University Farms supervisor. Beginning in 1960 Walter T. Bagley was placed immediately in charge, which responsibility he retained until he retired in 1985. Departmentally, administration of the Farm was shifted to Forestry when that department was established in 1974, and to Forestry, Fisheries and Wildlife with the establishment of that department in 1977. All of the administration has been handled from the East Campus.

Staff

As with administrators, none of the academic staff has ever been headquartered on the Farm, all research and educational work having been carried on by staff located on the East Campus.

Location

The Horning State Farm consists of 240 acres, is located about two miles south of Plattsmouth, Nebraska and is legally described as the SE 1/4 and the S1/2 of the NE1/4 of Section 30, Twp 12N, Rge 14E, Cass County, Nebraska. There was a farmstead (except for a house which had been destroyed by fire) on the premises when it came into possession of the University. The remains of the bodies of Eliza Olive Horning and her sister Ticia Blanche (Horning) Griffin were found in the ashes following the fire.

Early History

The Horning State Farm came into possession of the University of Nebraska through the estate of Eliza Olive Horning. The final decree of the will of Ms. Horning was issued on July 15, 1949. The will stated in part ". . . I give and devise said premises to the University of Nebraska to be used solely for the School of Agriculture as a fruit farm, or for forestry purposes, or as an experiment station and I direct that said lands shall not be disposed of for any other purpose . . .". The will further stated that James Edward Griffin[2] was to have use of the farm for his natural life.

Following Griffin's death on October 7, 1949, the University came into full possession of the farm (1).

Research and Development

The first research project was established in 1959. The survival and growth of 10 tree species treated with three herbicides were compared with those responses under manual cultivation. A regional Forestry Tree Improvement Committee (NC51) was activated in 1959 for the purpose of establishing joint research among agricultural experiment stations in the 12 states of the North Central Region and in 1960 Nebraska planted one of the Japanese larch provenance tests as its contributing project.

In 1961 $900 from regional research funds were made available to supplement the $2,000 operating budget for the Horning State Farm. In the following year (1962) passage of the McIntire-Stennis Act provided another and even more significant financial boost. The McIntire-Stennis program established a cooperative forestry research program whereby the federal government provided funds for approved projects on a 50/50 matching basis. The first grant in Nebraska was in the amount of $3,000 in 1964.

The USDA Rocky Mountain Forestry and Range Experiment Station became a vital part of the Nebraska forestry research program with the assignment of geneticists Ralph Read in 1953 and David F. Van Haverbeke in 1962, and pathologist Glenn W. Peterson in 1958 to the East Campus. These scientists assumed responsibility for research with coniferous species. With this increase in forestry staff, Walter T. Bagley was able to concentrate on deciduous species in addition to his farm management duties. More recently, pathologist Jerry Riffle and entomologists Mary Ellen Dix and Judith Pasek have joined the U.S. Forestry staff.

The greatest change in the farm landscape occurred in 1961 when all farming operations were terminated and thousands of trees were planted. Plantations dedicated to tree improvement included a Scotch pine provenance planting, a hybrid poplar test, selected black locusts, and seed source studies for bur oak, oriental arborvitae, and green ash. Progeny of a cross between black cherry and the capulan cherry plus plots of osage orange were also planted.

Provenance plantings were made of douglas fir, balsam fir and concolor fir (among other species) which

[1]Much of this material was provided by Walter T. Bagley, Professor of Forestry, Fisheries and Wildlife, emeritus.

[2]Husband of Eliza's sister Ticia Blanche (Horning) Griffin.

formerly had not been grown successfully in Nebraska. Despite the relative youth of the several provenance plantings compared to tree age at maturity, useful information has already been obtained. As a result of information gained from the trials, seedlings for forestry distribution programs are made from specific seed sources. Also, individual trees of concolor fir, balsam fir and a hybrid poplar with distinctive growth and foliar characteristics have been selected to be propagated as landscape trees.

Examples of seed sources which have proved to yield superior plants include: jack pine from Petawawa, Ontario; Austrian pine from Yugoslavia; douglas fir and southwestern white pine from specific sites in Arizona and New Mexico; ponderosa pine from north central Nebraska; and red oak from St. Paul, Minnesota.

An example of the continuing usefulness and versatility of the Horning State Farm is current use by Nebraska foresters of the mixed species plantings and the native woodland part of the property as timber stand improvement demonstrations. The project covering this work was initiated in 1976. Additionally, the Horning State Farm provides a living, visual resource for field days sponsored by the Nebraska Forestry Service and the Lower Platte South NRD. Horning State Farm became an affiliate site of the Nebraska Statewide Arboretum in 1979.

Fire Does Extensive Damage

On March 28, 1968, a damaging fire burned over 60 acres of plantings. The fire, which originated at a trash burner on neighboring land, was fanned by strong southwest winds and killed or damaged over 8,000 trees. Most of the 1961 Scotch pine planting was destroyed and many of the shelterbelts were severely damaged. Heroic efforts by neighbors and fire departments from nearby Murray and Plattsmouth saved many other plantings. A system of firebreaks was installed to preclude recurrence of such a disaster.

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Chapter 16. Plant Pathology[1]

Contents

Names of Department (1, pp 1-4)

Department of Agricultural Botany	1905-1918	Department of Plant Pathology	1920-present
Department of Plant Pathology and Physiology	1918-1920		

Administrators

Name	Title	Period Served
F. D. Heald	Station Botanist	1905-1908
E. Mead Wilcox	Station Botanist	1908-1918
E. Mead Wilcox	Station Plant Pathologist	1918-1920
George L. Peltier	Station Plant Pathologist and Chairman	1920-1937
Robert W. Goss	Chairman	1937-1949
William B. Allington	Chairman	1949-1961
John L. Weihing	Interim Chairman	1961-1962
J. M. Daly	Chairman	1962-1964
Michael G. Boosalis	Chairman	1964-1977
Michael G. Boosalis	Head	1977-1984
Anne K. Vidaver	Head	1984-present

[1]The authors gratefully acknowledge the assistance of Michael G. Boosalis for providing a major portion of the material for this chapter.

Headquarters Location (1, pp 3, 4)

Experiment Station Hall	1905-1914
Plant Industry Hall	1914-1979
Plant Science Hall	1979-present

In his first years as station botanist, before the Department of Agricultural Botany was established, Charles E. Bessey conducted his work on the City Campus, using a small greenhouse attached to old Nebraska Hall (1, p 2). Later, as an Experiment Station department (1905), Agricultural Botany had offices, laboratories and a lecture room on the top floor of Experiment Station Hall (presently the Agricultural Communications Building) (1, p 3).

In 1914, when E. Mead Wilcox was station botanist, the Department was moved to the new Plant Industry Hall. An account by R. W. Goss explains the move this way: (1, p 4)

"This structure had been designed as an office, laboratory and classroom building but without the specific needs of any particular department being considered. According to legend, no department assignments had been made at the time the building was completed, but Dr. Wilcox considered the facilities such an improvement over existing quarters that he recruited a group of students on a Sunday morning and moved the department furniture and equipment into the third floor of the Plant Industry Hall, taking possession by 'squatter's rights.' "

Facilities were greatly improved during the period 1949-1961. The University completely reconditioned Plant Industry Hall in 1953, providing more and better offices and laboratories, including four refrigerated walk-in incubators. In 1958, the attic was utilized for the installation of four large growth rooms with temperature (refrigeration) and light control, an adjacent potting and sterilization room, and a small laboratory for work involving radioactive materials (1, p 9).

In 1956, the University also constructed a new office and laboratory building at the Panhandle Station (2). Greatly improved facilities were thus made available to the Department for the work of the staff member located there during the summer (1, p 10).

Still better and much more spacious facilities were yet to come. In January 1979, the Department moved to its new quarters, consisting of the entire fourth floor of the Plant Science Hall.

Bessey Promoted Plant Disease Work in Mid-1880's

Although plant pathology was not officially recognized as an entity separate and distinct from botany until about 1920, studies of plant diseases were begun before the Agricultural Experiment Station was established in 1887.

Both Robert W. Goss (1, p 1) and Robert P. Crawford (5, p 4) credit Charles E. Bessey with promoting plant disease work in the mid-1880's. Bessey came to the University as dean of the Industrial College[2] and professor of botany and horticulture in 1884. As the first director of the Agricultural Experiment Station, he outlined and directed the early work of the Station, and promoted the study of plant diseases, forestry, and other agricultural sciences (5, p 4).

First Budget — $5

"Even in his inaugural address, he urged that the College . . . undertake the study of plant diseases, particularly cereal rusts," according to Goss. In the same year, Bessey recommended to the chancellor the establishment of an organized program of agricultural research which was approved by the Regents in 1887.

"One of the 11 projects undertaken was the study of injurious fungi. However, major emphasis in agricultural research was on animal disease investigations. Only $5 (apparently for stationery) out of a budget of $3,500 was allotted to the Botany Department . . . for the study of grasses, forage plants and injurious fungi" (1, p 1).

"During those early years and up to 1905, the work in agricultural botany and particularly plant pathology was greatly handicapped by lack of staff, funds and quarters. In the first year of federal funds (Hatch Act funds) for the Experiment Station, none of the $15,000 went to botany and in some of the following years the amounts varied from $100 to $700 for all expenses, including books" (1, p 1).

By 1905, pathology was becoming almost a subject of its own and, in fact, it constituted a great part of the work of the Botany Department, especially the experimental work (5, p 95).

Bessey and his students had published a number of reports on plant diseases and other phases of botany. For example, *Wheat Rust*, by Charles E. Bessey (Press Bulletin 2 of the Agricultural Experiment Station, 1890) was "the first Nebraska plant disease bulletin on the relation of barberry and weather to rust and speculation on its occurrence in western Nebraska in the absence of barberry" (1, p 2).

Research Reported in 1889

Bulletin 11 of the Experiment Station, published in 1889, included these articles: "The Smut of Wheat and Oats," by Joseph C. Arthur; "The Smut of Indian Corn," by Charles E. Bessey; "A Preliminary Enumeration of the Rusts and Smuts of Nebraska," by Herbert J. Webber; "Notes on the Fungi of Economic Interest, Observed in Lancaster County, Nebraska, during the Summer of 1889," by Roscoe Pound; and "Observations on the Cottonwood," by Albert F. Woods (5, p 55, and 6, p 80).

[2]The Industrial College was created by an act of the Nebraska Legislature in 1877 to embrace agriculture, practical science, civil engineering and mechanic arts (5, p 44). The Industrial College was terminated in 1909 and the College of Agriculture again became a separate entity, as it had been prior to 1877.

Teaching

The Horticulture Department offered what was probably the first course in plant pathology as crytogamic botany. However, Bessey, in 1884-85, offered four courses in botany and explained that botany in the Arts and Sciences College would be presented as a biological rather than a classification science. The courses were chiefly anatomical and physiological. The next year he included diseases of plants as part of the botany course in the Agricultural College (1, p 1).

In 1918, all teaching of botany in the College of Agriculture, including plant pathology, was transferred to the Botany Department in the College of Arts and Sciences.

During the period 1920-1937 the teaching program was confined to a basic elementary course for seniors and graduate students followed by three graduate courses on cereal and forage, fruit, and vegetable diseases, a course in research methods and a seminar. Later, an elementary lecture course was provided for undergraduates. With only two full-time staff members and relatively little time for teaching, the graduate program was limited to the MS degree (1, p 7). In about 1946 the PhD program was added (1, p 8) with the first degree awarded in 1949 (7).

"From time to time, the plant pathology faculty considered separating its teaching program from botany and placing it in the College of Agriculture," Boosalis wrote in a history of the Department in 1984. "There are some faculty members who have strong feelings in favor of the separation, as well as those who strongly oppose separation" (4, p 6).

In 1973 The Department of Plant Pathology joined the School of Life Sciences for its teaching component with funding being continued by the College of Agriculture.

Research

Research Through the 1950's

The two major lines of research requested in 1920 were cereal rust investigations (due to the great losses occurring at that time) and potato fungal disease studies particularly relating to certification and irrigation.

This was followed by work on the potato viruses and on the soil-borne diseases, scab and rhizoctonia, and their occurrence in relation to soil microflora and systems of crop rotation (1, p 5).

Research on cereal rusts centered on the study of their occurrence, the biologic forms present, the relation of their occurrence in Nebraska to their prevalence in other states south of Nebraska from which the inoculum came, and the effect of environmental factors such as light and temperature on the type of pustules developed.

In the mid-twenties, the failure of many alfalfa fields led to a demand for research on this problem. The Legislature voted a special appropriation of $25,000 for a study. The alfalfa losses were found to be due primarily to bacterial wilt. A study of the anatomy and etiology of this disease and its relation to winter injury was undertaken (1, p 6). (See also Part V, Chapter 6.)

During the late thirties and through the forties, the major lines of investigation were potato viruses and soil-borne diseases, bean bacterial blights, bacterial diseases of tomato, cereal rusts and seedling blights, corn stalk rots, and sugar beet diseases. A comprehensive basic study of virus diseases was initiated (1, p 7).

Beginning in 1948, a major change in the basic concept of the Department's research program was developed. The crop basis of research was gradually changed to one of emphasis on groups of causal factors or basic concepts of disease phenomena.

This realignment of the research program resulted in Max L. Schuster heading up a program on nematodes, Michael G. Boosalis on soil-borne parasites, J. M. Daly on host-parasite relations (particulary on rusts), William B. Allington on viruses, and Robert W. Goss on mycorrhiza, particularly of pines.

Through a cooperative arrangement with the U. S. Forest Service in 1958, Glenn W. Peterson was stationed with the Department to conduct studies on tree diseases particularly related to nursery problems. His work was closely tied in with the Nebraska National Forest and Nursery at Halsey. (1, pp 5-9)

When Boosalis was appointed chairman in 1964, goals were set to build on the Department's record of excellence in research, extension and teaching.

Research in Later Years (7).

In 1960, J. M. Daly's research on the physiological and biochemical processes associated with resistance and susceptibility of wheat to the wheat rust fungus led to the discovery of several fundamental principles associated with how plants withstand fungal infections.

In 1972, Joseph S. Semancik co-discovered plant viroids. Viroids are small infectious RNA molecules and represent a new type of infectious agent on plants.

Anne K. Vidaver discovered, in 1979, that specialized antibiotics called bacteriocins may be produced by bacteria in plants. These bacteriocins give a selective advantage to bacteria which produce them because they arrest the development of competing bacteria.

Leslie C. Lane has developed simple gel electrophoretic methods for diagnosing plant viruses. Lane, Benjamin L. Doupnik, Jr., and David Wysong evaluated corn inbreds and hybrids for reaction to corn lethal necrosis induced by two viruses interacting with each other.

Research by Vidaver, James L. Van Etten and Semancik will provide new information on gene expression and regulation in photosynthetic eukaryotic organisms. Van Etten's studies, between 1966 and 1980, on fungal development provided basic information on fungal spore germination.

Willem G. Langenberg (USDA-ARS) has made many improvements on embedding and sectioning techniques necessary to examine plant tissue in the electron microscope.

Since coming to the University in 1954, Ellen M. Ball has used rabbits to produce antisera that can identify many plant pathogens, and biological substances and structures: viruses, bacteria, fungi, enzymes, cell walls, ribosomes and other components. Also, she has derived virus-free potato plants from treated meristem tissue.

James R. Steadman has devised methods of reducing white mold on beans, including microclimate modification, and with Dermot P. Coyne (Department of Horticulture) has developed varieties of dry edible beans with resistance to bacterial blight and white mold — two of the most destructive diseases of the crop.

Glenn W. Peterson (USDA-Forest Service) identified sources of pine resistant to the destructive and prevalent needle blight fungus and to the western gall ruse fungus. Jerry W. Riffle (USDA-Forest Service) in 1983 in cooperation with statisticians developed a method for sampling trees in windbreaks for occurrence of stem diseases.

Eric Kerr's research resulted in the selection of pesticides for the control of nematodes and powdery mildews of sugar beets.

Research by John E. Watkins and Benjamin L. Doupnik, Jr. led to the effective control of leaf rust, septoria leaf blotch and tan spot of wheat by aerial application of selective fungicides.

David S. Wysong has conducted "operation safe" fly clinics throughout Nebraska. These efforts have significantly improved the efficiency and safety of aerial application of pesticides. Wysong and Doupnik identified corn inbred lines and hybrids resistant to Goss's bacterial wilt and blight of corn (7).

Myron K. Brakke's most notable achievement was the development of sucrose density gradient centrifugation which is commonly used in almost all major biological and biochemical research centers. Density gradient centrifugation has contributed greatly to our understanding of nucleic acid structure and protein synthesis, and to the isolation of subcellular organelles. And it continues to be an essential technique for isolating and characterizing viruses. Brakke was among the first to demonstrate the potential of electron microscopy for serological identification of viruses. He showed that a virus-induced phenomenon, termed aberrant ratio, previously thought to involve complex regulation, can be explained by simple mutations (7).

Anne K. Vidaver has added to the understanding of the epidemiology of the bacterial corn pathogen, *Corynebacterium michiganense* subspecies *Nebraskense*. She reopened one area of bacteriophage and all its implication with her discovery of the only phage having a double-stranded RNA genome and a divided genome, as well as the only RNA phage with a lipid envelope (7).

Extension

In 1938 an extension plant pathologist was appointed to take over the disease work previously handled by the agronomy and horticulture extension specialists. To keep the program closely correlated with research, the appointment of Jesse E. Livingston was made jointly with the Experiment Station on a half-time basis. In 1946, Arden F. Sherf became a half-time assistant in Extension. The next year he was put in charge of the extension work, and Livingston was transferred to teaching and research.

In 1948 supervision of the Outstate Testing Program work in plant pathology was delegated to the extension specialist (1, p 8). (For further information on the Outstate Testing Program see Part V, Chapter 6).

Extension programs were developed for the control of two important potato diseases—bacterial ring rot and late blight (1, p 8).

After John L. Weihing was appointed full time extension plant pathologist in 1952 (3), he was able to correlate extension work with the research program through a special arrangement with the Extension Service which permitted the extension pathologist to carry on some research (1, p 8).

From 1964 to 1966, David S. Wysong was the only full-time extension plant pathologist in the state (4, p 5).

Eric Kerr was appointed full time extension plant pathologist at the Panhandle Research and Extension Center in 1967. In 1980 his appointment was changed to 50 percent extension and 50 percent research. Kerr established effective nematocide treatments against nematode diseases of sugar beets and provided the industry with guidelines for determining populations of nematodes in ascertaining threshold levels for nematocide treatments (4, p 5).

A few examples of Extension accomplishments include aerial application of chemicals to control leaf rust, septoria blight and tan spot of wheat; application of nematocides to control lesion nematodes of sugar beets; aerial application of fungicides to control powdery mildew of sugar beets; control of diseases of turf grass through application of fungicide and cultural practices; control of plant diseases associated with conservation tillage, particularly stalk rot of sorghum and corn; and establishment of procedures to detect mycotoxins in cereal grains (4, p 10).

More recently initiated Extension programs include (1) a pesticide application training program, (2) establishment of a plant disease herbarium of over 200 specimens used in Extension workshops and in teaching the two introductory plant pathology courses, (3) development of cultural practices for control of *Cephalosporium* stripe of wheat, (4) studies to determine the effect of lesion nematodes on corn, and (5) studies to evaluate the carry-over effects of nematocidal soil treatments in a corn-bean-sugar beet rotation (4, p 11).

John L. Weihing was one of the founders of the popular Backyard Farmer television program, the first University-sponsored television program to provide timely information on gardens, ornamentals, turfgrasses and trees (4, p 11).

Weihing was also the first to suggest publication of the successful phytopathological compendia on diseases of crop commodities. In the 1950's, he and his colleagues in the Departments of Agronomy, Horticulture and Entomology founded the Corn Hail Workshop which presents information on agronomic topics, insects, weeds and plant diseases of corn that relate to hail.

Weihing was also instrumental in establishing the annual Turfgrass Conference started in 1962 (4, p 11).

International Programs

As a part of the UN Technical Assistance Program in Turkey, Weihing served as chairman of the Department of Plant Science and professor of Plant Science at Ataturk University, Erzurum, Turkey from 1964 to 1966.

Weihing implemented the administrative structure in the area of plant science which is still used at Ataturk University. He developed curricula for academic areas within the Plant Science Department and arranged a system for developing research projects within the University's Research Institute.

Weihing initiated a research program on the blue mold disease of tobacco which identified tobacco varieties resistant to the disease. This was an important contribution to Turkey's agricultural economy, as tobacco constitutes one-third of the country's export revenue (7).

Individual Honors

Staff

Elected to membership in the National Academy of Sciences

Myron K. Brakke[3]	1974

Appointed Regents Professor

Myron K. Brakke	1974
James L. Van Etten	1986

Receiving the University of Nebraska Outstanding Research and Creative Activity Award

Myron K. Brakke	1982

Receiving the USDA Superior Service Award

Myron K. Brakke	1968 and 1986

[3]As far as we have been able to determine, Brakke was the first staff member in the history of the University of Nebraska to receive this signal honor.

Serving as president of the American Phytopathological Society:

Anne K. Vidaver	1987

Alumni

Receiving honorary doctorates from the University of Nebraska

James H. Jensen	1966

Served as President of Oregon State University

James H. Jensen	1961-1969

Served as Senator in the Nebraska Legislature

John L. Weihing	1987-present

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Chapter 17. Poultry and Wildlife Sciences[1]

Contents

Names of Department

Department of Poultry Husbandry	1922-1963
Department of Poultry Science	1964-1973
Department of Poultry & Wildlife Sciences	1973-1977[2]

Administrators

Frank E. Mussehl, Chairman	1922-1957
John L. Adams, Chairman	1957-1964
Ted E. Hartung, Chairman	1965-1972
Glenn W. Froning, Chairman	1972-1977

Headquarters Locations on Campus

Rural Economics Hall[3]
(renamed Poultry Husbandry Hall in 1936)
1922-1954

Poultry Husbandry Hall[4]
(previously named Motor Truck Laboratory)
1954-1977

Before 1922

Teaching and Research

Initially, poultry husbandry was part of the Department of Animal Husbandry (to which it returned in 1977). M. E. Dickson became professor of poultry husbandry in the Department of Animal Husbandry in 1915. In 1916, for the first time, courses were offered in poultry. They were elementary poultry management (two courses), poultry practice, and incubation and brooding. Dickson left the University in 1917 on very short notice for a much better paying job in Texas, and was replaced almost immediately by Frank E. Mussehl. Mussehl continued poultry work in the Department of Animal Husbandry until 1922 when the new Department of Poultry Husbandry was established (1, 2).

Extension (3)

The first extension poultryman at the University was A. G. Peters who began his work in 1918. It was about this time that poultry producers learned it was possible through a study of physical characteristics to determine a laying hen from the nonlaying hen. As this news spread, the demand for demonstrators grew so sharply that two additional extension poultrymen were added to the staff, H. M. Wells and C. T. Cornman.

Erle Smiley, a well known poultry judge and fancier, was also employed as extension poultryman. His main work consisted of attempting to develop county poultry organizations, and encouraging poultry shows. Lack of interest resulted in a discontinuation of this work, and Smiley's services were discontinued after about one year.

A program known as Flock Accreditation was established in 1921. In this program extension poultrymen enrolled cooperators who followed prescribed management practices and kept records which were summarized by Extension for publicity purposes. Those with outstanding performance records were given awards of achievement and recognized as "chicken-minded" people. J. R. Redditt (3) reported that in time it was found that ". . . too many records were prepared for publicity purposes rather than a history of the flock." He did not say in so many words that some of the records were rigged.

In 1919, during the month of June, 152,000 copies of Circular 5, *Confine the Cockerel* were distributed to local "cash buyers" of poultry. It was suggested that a copy of the circular be placed in the egg case or fastened to the cream check of the customers (4). In 1921, the principal lines of poultry extension work consisted of demonstration farms, culling demonstra-

[1]The authors gratefully acknowledge the assistance of Doyle H. Free, Glenn W. Froning, Earl W. Gleaves and Thomas W. Sullivan in providing information for this chapter for the period 1957 to 1977.

[2]At which time the Department was merged with Animal Science.

[3]Named Dairy Building from 1896-1917; Agriculture Administration Annex from 1956-1973.

[4]Different building from the one above but with the same name.

tions, poultry boys and girls clubs (81 clubs with 667 members in 1920), and standard bred poultry (selection of breeding stock and proper mating) (4).

The Mussehl Era, 1922-1957

Mussehl, the Man

Frank E. Mussehl was the first chairman of the Poultry Department, serving for 35 years. He was a strong believer in his profession and, in fact, practiced it privately as well as publicly, by purchasing a number of tracts of land in the Lincoln vicinity over the years and establishing poultry production enterprises. He took much interest in students, and University programs and activities as a whole. In 1964, John L. Adams, in characterizing the Department, could have done no better in describing Mussehl's approach and accomplishments, when he wrote, "We have maintained good industry relations and have probably moved further than any other department in utilizing our full staff in extension activities. This concept of total staff participation is enthusiastically supported by our entire staff".

Not only was Mussehl an entrepreneur, and an academic administrator operating a closely integrated teaching, research, and extension program, but he was also a self-made philosopher and economist. In 1944, in addressing the topic of freedom from want, he emphasized four points: 1) retain the best qualities of the free enterprise system, 2) support the system with a government guarantee of reasonably full employment at all times—wealth is still wealth whether publicly or privately produced, 3) noting that 25 percent of the population was not covered by Social Security, including farmers, he said the program should either be extended or repealed; and 4) he stated that we can properly ask for a "floor" under certain basic farm products when adjustments are necessary (6).

Teaching

In Mussehl's first year as chairman, 1922-23, six courses were taught in the Department, all by Stanley J. Marsden and Mussehl. The courses were poultry management, incubation and brooding, poultry judging and breeding, market poultry and market eggs, research in poultry husbandry, and special methods for teaching poultry husbandry. The Department kept representative birds of the most common breeds, including 1,600 layers, and had incubation and brooding equipment for 4,000 chicks and turkey poults.

In 1957, Mussehl's last year as chairman, the six courses offered in 1922 were still being taught, plus nine additional ones (including a joint seminar with Animal Husbandry and Dairy Husbandry). The facilities available were the same as listed in 1922-23 except that the number of layers had been increased to 3,500 and the number of chicks to 8,000 (7). Facilities were also available for turkeys. It was now possible to earn a master's degree with either a major or minor in the Department of Poultry Husbandry.

F. E. Mussehl selecting and judging laying hens during a class in the early 1920's.

In 1949-50, a course in game management (including game birds) which had been taught since 1937-38 in the Agronomy Department was transferred to the Poultry Department under the new title of wildlife management. From 1948-49 to the present time, the course has been taught by Howard L. Wiegers, since 1977 in the Department of Forestry, Fisheries and Wildlife. Not only has the course been a very popular one with students, but also in time the wildlife area attracted a considerable number of undergraduate majors.

Research

On February 1, 1923, F. E. Mussehl reported the results of studies concerning egg production of different breeds. His research on the nutrition of growing chicks was first reported on February 1, 1924. His goal was to develop a basic ration that would support chick growth. Mussehl continued this experimentation until his retirement in 1957, much of the time in cooperation with C. W. Ackerson of Agricultural Biochemistry (8).

Mussehl and co-workers observed and recorded the activation of vitamin D by the ultraviolet rays of direct sunlight. Paul M. Bancroft (M.D.), a long-time Lincoln pediatrician, assisted Mussehl in this research, first as a high school student working part time (1918-1919), and later as a college student. The ultraviolet activation of vitamin D was characterized by Bancroft in 1982 as one of the major discoveries of the 20th century. He stated, "the medical profession is indeed indebted to Professor Frank Mussehl, a Nebraskan who has not previously been recognized in the medical literature".

According to Bancroft, Mussehl prepared a paper on his findings in 1919-1920. However, after receiving

a strongly negative reaction in a review by a prestigious University senior scientist, Mussehl, the young staff member with only a BS degree, did not feel it prudent to publish. Meanwhile, others working independently, reported similar findings (9).

Early in 1925 Mussehl and Bancroft published the results of their studies. They reported that sunlight prevented rickets, but not if it was passed through ordinary window glass because the ultraviolet rays were filtered out, and they were the active agent influencing calcium and phosphorus assimilation to prevent rickets. The Nebraska workers also wrote that "in the absence of proper lighting conditions, 2.0 percent of cod liver oil added to the ration furnished vitamin D that has the same effect on calcium and phosphorus assimilation in preventing rickets, as does direct sunlight" (8, 9, 11).

By 1924 other projects had been added at the Nebraska Experiment Station on inheritance of egg production and artificial brooding of turkey poults. During the ensuing years, the research on poults was broadened to include nutrition and various aspects of turkey production. Experiments on proteins in poultry feeding were begun in 1934. Studies of sunlamp radiation for laying hens, and field feeding of grain sorghums to turkeys were conducted in 1939. Investigations in 1944 included safflower as a feedstuff, riboflavin (vitamin B_2) in poultry feedstuffs, and battery brooding vs floor brooding for chicks. By 1949 the list of research projects included chicken and turkey breeding, and poultry product investigations. Artificial breeding (insemination) of turkeys was added in 1950 (8). This work was led by Howard Wiegers —one of the first investigations in this field.

Most research studies were done at the poultry farm north of the tractor testing area on the west side of the campus. Turkey range rearing studies and feeding trials were conducted north of Havelock Avenue between 70th and 84th streets. In 1955 when Paul Griminger (nutrition) joined the faculty, the north room of the Chemurgy Building (formerly Meat Laboratory) was renovated for poultry research (8, 12, 13).

In the Experiment Station Annual Report for 1957, six poultry staff members were listed on the Station roster for the East Campus and one for North Platte (those at Lincoln also did the teaching). Eleven research projects were listed which covered 1) nutrition of chicks and poults—feedstuffs, minerals, vitamin D_3, food elements, and amino acid requirements; 2) chicken breeding; and 3) turkey hatchability and management studies (8).

Extension

In summarizing extension work up to 1939, Redditt wrote ". . . 4-H poultry clubs have always been given a major consideration . . . A Nebraska team was one of four state teams represented at the World's Poultry Congress held in Canada in 1927.

"Phases of the poultry program, which have come in for more or less major consideration, include turkey production and marketing, poultry equipment, poultry feed service, record flock testing, cost accounting, and the National Poultry Improvement Plan . . . Turkey production has increased over 500% in Nebraska in the last ten years (1928-1938) . . . it is well to remember that modern turkey production originated in Nebraska where the first experiment station work with turkeys was done and where the first Station turkey bulletin was written (3).

"Since the beginning of extension poultry work in Nebraska in 1918, a total of eight men have been employed, five of whom were in and out during the first seven years of the work. The present personnel is beginning fourteen years of service" (3).

An extension type activity of major importance took place in 1926 when Val Kuska, of the Burlington Railroad, and Mussehl, in cooperation with Kansas State College, organized the Burlington Poultry Train. The purpose was to show people how they could make the poultry business more profitable. The train consisted of a series of poultry exhibits. It made 110 stops in a 30-day period in Nebraska and Kansas, attracting a total attendance of 206,512. The largest crowd was at Fairbury where 4,616 persons viewed the exhibit (14). Later that year there was a "cow and hen special" on the Northwestern Railroad (2).

By the end of 1939, poultry extension specialists reported on participation in the World's Poultry Congress in Cleveland; an attendance of 450 at the 1939 Nebraska Poultry Field Day, which had been held for 23 or 24 years; and the fact that poultry tours were becoming a tradition (turkeys were emphasized) (4).

By 1942, work on disease prevention was being emphasized. In the 1944 report there was a section on experiments with artificial insemination of turkeys.

An interesting development in 1949 was an attempt to increase broiler production in Nebraska. J. R. Redditt, former extension poultryman, was hired for one year to head the project. Funding was provided by Nebraska members of the American Poultry Industries. It was stated that disease control was the major problem, but that in spite of this, three million broilers were produced in Nebraska in 1949 (4). The promotional effort did not result in lasting success.

As the Mussehl era drew to a close the National Poultry Improvement Plan (mentioned by Redditt in his 1939 report) was still going strong. Poultry improvement programs were being conducted, broiler production was encouraged, turkey production was being encouraged through the National Turkey Improvement Plan, and demonstration flocks were established to check ". . . the effectiveness on the farm of incross breeding work . . . done at experiment stations . . ." There were 383 4-H club members in 1953. Special events included 4-H poultry exhibits and a judging contest at the State Fair, and the Nebraska Poultry Association judging contest held in connec-

tion with the State Poultry Show (4).

Joseph H. Claybaugh was a dedicated and productive extension worker for 30 years (1925-1955). He was first a county extension agent and later a poultry extension specialist. Claybaugh was also an adept carpenter and during the late 1920's he held meetings to demonstrate the construction of poultry buildings and equipment. He was a leader in the National Poultry Improvement Plan in Nebraska, especially in pullorum testing, hatchery inspection and breed improvement. Claybaugh also assisted with the Nebraska Random Sample Turkey Testing during the 1950's.

Mussehl's 1956 View of the Poultry Industry

At one of the last public appearances made by Mussehl (late 1956) before he retired, he said that the poultry business was moving slowly but surely toward specialization. He encouraged people to go into the business only if they liked poultry and would take the time to become skilled at this kind of "biological engineering". "Chickens, eggs and turkeys are a business", he said (15, p 32).

The Adams, Hartung, Froning Era, 1957 - 1977

John L. "Jack" Adams came to the University of Nebraska in 1957 from a poultry science faculty position at the University of Wisconsin. He brought new ideas and a creative, fearless, leadership to the Poultry Husbandry Department.

With support from the College of Agriculture administration, Adams quickly hired additional, more highly trained faculty, and in 1963 obtained a new research and teaching facility. The new Poultry Complex consisted of eight frame buildings and one metal building west of 38th Street and north of the East Campus Loop. Some 40 odd buildings at the old Poultry Farm were dismantled immediately. Adams wasn't afraid to try new ideas, a new approach or a new technique in research and teaching.

Ted E. Hartung was appointed chairman of Poultry Science in April 1965. He served in a dual capacity as chairman of Poultry Science and the newly formed Food Science and Technology Department from 1968 until 1972. As the Food Science and Technology program expanded, Hartung gave up the poultry chairmanship.

Glenn W. Froning, appointed chairman of Poultry Science in 1972, specialized in products technology. Research productivity, graduate teaching and the Department's role in development of the commercial poultry industry grew steadily under the leadership of Hartung and Froning. During Froning's tenure as chairman, the Department name was changed to Poultry and Wildlife Sciences (1973), reflecting the growth in undergraduate majors, addition of faculty and expansion of programs in wildlife management. In 1977, Poultry Science was merged with Animal Science. Wildlife Sciences was simultaneously merged with Forestry, forming the Department of Forestry, Fisheries and Wildlife.

The Faculty

There was much turnover in the poultry faculty during the Adams, Hartung, Froning era. Only Doyle H. Free served the entire 20-year period. However, two faculty members, Tom W. Sullivan who joined the department in July 1958 in nutrition, and Earl W. Gleaves who became extension poultryman in Sep-

John L. Adams provided fearless and creative leadership for the Poultry Husbandry Department. In background are Minnie (Royal) Stephens, Department secretary, and Howard L. Wiegers.

tember 1964, served 19 and 13 years respectively during this period.

Teaching

From 1957 to 1960 course offerings were changing as new faculty were recruited, and the Department's programs were redirected. Teaching and research programs in products technology were started, and the breeding and genetics area was discontinued. These shifts were in response to changes in commercial poultry breeding, and the emphasis on marketing with the development of many new egg and poultry meat products.

In 1963 courses were offered in incubation and brooding, management, judging and selection, nutrition, products technology, and wildlife management. Faculty members J. L. Adams, T. L. Goodwin, W. J. Owings, J. L. Skinner, T. W. Sullivan and H. W. Wiegers, were involved in the teaching program.

The number of BS degree recipients from 1957 to 1977 with a poultry emphasis was at least 25. However, a large number of additional students received BS degrees in general agriculture with a wildlife management emphasis. Howard Wiegers taught a wildlife management course and advised these students (see also Part V, Chapter 12). Advanced degrees awarded from 1958 through May 1977 totaled 27 MS and 13 PhD degrees. Tom Sullivan (nutrition) was faculty advisor for 19, or nearly half of these graduate degree recipients.

Only BS and MS degree programs were offered in the Poultry Science Department during this period. The PhD students doing their research in poultry science received their degrees in either the Nutrition Interdepartmental Area (organized in 1962), or the Food Science and Technology Department (organized in 1968).

During the late 1960's and early 1970's poultry judging teams participated in the national contest at the University of Tennessee, and at a regional contest at the University of Arkansas. However, this was not a regular ongoing activity due to low undergraduate enrollment. Senior graduate students including James H. Whitmore, Michael Henley, and David P. Holder coached these teams.

Poultry Science Club was active from 1970 to 1974 when undergraduate enrollment was greater than in other years. Six to ten students participated in various club activities including meetings, industry tours, industry conventions and scientific meetings. The sale of fresh processed turkeys at Thanksgiving was a successful fund raising activity initiated by the Poultry Science Club. This activity has since been continued by the Animal Science Graduate Student Association.

Research (10)

During the period 1958 to 1977, research was conducted principally in management and housing, nutrition, and products technology. Jack Adams compared four housing systems for layers—slatted floors, partial slats, litter, and cages. Adams' research with indoor lagoons (liquid manure pits) in laying houses was the first such work. Outdoor lagoons and deep (dry) manure pits under slatted floors and cages are widely used today in both poultry and swine production.

Mineral nutrition of turkeys and laying hens was a major research area for Tom Sullivan from 1959 through the 1970's. Emphasis was given to calcium and phosphorus requirements of laying hens and market turkeys. Sullivan's research defined the turkey's requirement for calcium, phosphorus, magnesium, sodium, chloride, potassium, iron, copper, manganese and zinc. The safety and efficacy of many antibiotic supplements and disease preventive drugs (especially the histomonastats) for turkeys were determined by Sullivan and coworkers.

Outstanding contributions to the knowledge of the chemical, physical and functional properties of turkey meat were made by the Department in the late 1960's and the 1970's. Glenn Froning was the leader and Ted Hartung also participated in this work. Froning determined the factors contributing to color abnormalities in poultry meats, and provided basic knowledge on mechanically deboned poultry meat, especially its functional properties.

Factors influencing the feed consumption of laying hens were the focus of research by Earl Gleaves. The effects of egg production rate, environmental temperature, protein and amino acid levels, calcium, and caloric level in the diet were evaluated. Results of these studies were eagerly sought by egg producers in Nebraska and other states. Gleaves' work as extension poultryman was enhanced by this research.

Research efforts were handicapped by inadequate facilities until 1963, when a new Poultry Complex was constructed. Prior to 1963, research studies were conducted principally at the old, outdated Poultry Farm, the Chemurgy Building (cage layers) and on the second floor of the Horse Barn (starting batteries for chicks and poults).

Extension (16)

The 1960's were a period of transition for the poultry industry, a transition from farm flocks of a few hundred birds to commercial units of several thousand. In Nebraska, this transition was slower and more painful than in some other areas for several reasons. The farm flock business was fairly large overall and profitable for hatcherymen, feed suppliers and others. The egg processing industry provided a steady market for Nebraska producers, and turkey growers could market their birds through the co-op processing plant at Gibbon. Nebraska farmers had a number of alternatives to poultry production in the 1960's including cash grain, swine and beef cattle.

In 1956 there were more than eight million chickens (layers) on 60,000 of Nebraska's 90,000 farms. Nearly 800,000 turkeys were produced by 150 growers in central and eastern Nebraska in 1956. The decline in layer numbers began in the 1950's and continued through 1977. By the late 1970's the loss of small flocks was being offset by the addition of laying hens in large commercial units.

Leadership of the extension program has been in the hands of Doyle H. Free, John L. Skinner and Earl W. Gleaves since 1950. Free started in 1950, Skinner served from 1956 to 1963 and Gleaves since 1964.

The strength and viability of the commercial poultry industry in Nebraska during the 1980's resulted in large part from changes and initiatives of the 1970's. These are: 1) the growth of commercial egg production from 100,000 hens in 1964 to 3.5 million in 1983; 2) the survival, reorganization and growth of Nebraska Turkey Growers Co-op Association and its processing plant at Gibbon; 3) organization and successful operation of an egg producers cooperative in southeast Nebraska and northeast Kansas, and 4) growth of the 4-H poultry program from about 300 participants in 1965 to over 6,000 in 1983.

International Programs (10)

The Poultry Science Department was actively involved in the Nebraska Mission in Colombia, beginning in 1966 and continuing for five or six years. Alex G. Warren was the poultry project leader in Bogota. Ted Hartung conducted two workshops on poultry management in Colombia. Glenn Froning conducted workshops there on egg handling, marketing, and broiler and turkey processing in 1970.

Cooperation with Other Organizations (16)

Nebraska Department of Agriculture

Since the early 1950's, Doyle H. Free has worked with the State Department of Agriculture in disease control, inspection and check-off programs.

The Division of Poultry and Egg Development, Utilization and Marketing was created in 1976 with passage of the Poultry and Egg Resources Act by the Nebraska Legislature. The Act provides that the Division may cooperate with local, state, regional or national organizations whether public or private, in conducting programs that would enhance the image of poultry, eggs and products thereof.

A voluntary check-off fee of up to 5 cents per case of eggs (30 dozen) and 3 cents per turkey marketed may be assessed to conduct these programs. The rate set in 1978 was 3 cents per case of eggs, 1.5 cents per hen turkey and 2 cents per tom turkey. Funds from the check-off programs have supported the poultry and egg industry through consumer and food service promotion of eggs and turkey meat development.

Related Organizations (10)

Nebraska State Poultry Association organized in 1884, is composed of poultry fanciers, breeders and exhibitors. In recent years the association has annually held at least one show or exhibition, and has sponsored the poultry show at the State Fair in Lincoln. University extension personnel have served this organization in an advisory capacity for many years.

Nebraska Poultry Improvement Association was organized September 3, 1935, as the Nebraska Approved Hatcheries Association, and was renamed at the annual meeting in October 1935. The initial objective was to formulate and supervise a hatchery and breeding flock program by acting as the "official state agency" in Nebraska for the National Poultry Improvement Plan that became operative July 1, 1935.

Objectives of the Plan were to improve the breeding and production qualities of poultry and to reduce losses from pullorum and other hatchery-designated diseases. Extension poultry specialists were largely responsible for the work and leadership of this association from 1935 to 1955. Joseph H. Claybaugh played a leading role from 1935 until his retirement. Doyle H. Free has been executive secretary of the Nebraska Poultry Improvement Association from 1950 to the present (1987). Free also became the leader of the National Plan's program in Nebraska following Claybaugh's retirement in 1955.

Nebraska Turkey Federation was organized in 1942. During the early years, University extension specialists served only in an advisory capacity. However, in 1955 Glenn Thacker, extension poultryman, was elected secretary. He was followed by John L. Skinner, and still later by Doyle H. Free.

Nebraska Poultry Industries, Inc. (NPI) was formed in 1969 as the "umbrella" organization for the Nebraska Poultry Improvement Association, Nebraska Egg Council, Nebraska Turkey Federation and Nebraska Allied Poultry Industries. Doyle H. Free was named general manager of NPI. Earl Gleaves is a member of the Board of Directors.

Major Office Held

Ted E. Hartung served as president of the Poultry Science Association during 1968-69.

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Chapter 18. Veterinary Science[1]

Contents

Names of Department (1; 2, p 52; 4)

Pathobiology Laboratory	1886-1894	Department of Animal Pathology and Hygiene	1918-1960
Department of Animal Pathology	1894-1918	Department of Veterinary Science	1960-present

Administrators (3; 4; 6)

Name	Title	Period served
Frank S. Billings	Director	1886-1889
Langdon Frothingham	Acting Director	1890-1891
Frank S. Billings	Director	1891-1893
A. T. Peters	Head	1894-1909
James H. Gain	Head	1909-1918
Leunis Van Es	Head	1918-1919
Leunis Van Es	Chairman	1919-1945
Carl Olson, Jr.	Chairman	1945-1956
George A. Young	Chairman	1956-1964
Loyal C. Payne	Acting Chairman	1964
Marvin J. Twiehaus	Chairman	1964-1976
Oliver D. Grace	Acting Chairman	1976-1977
Earl O. Dickinson	Chairman	1977
Earl O. Dickinson	Head	1977-1983
R. Gene White	Interim Head	1983-1984
John A. Schmitz	Head	1984-present

Headquarters Location and Buildings Occupied

1886-(NA) Three rooms in University Hall[2]—laboratory, culture room and office; an animal house on City Campus; and small building at the State Farm (now East Campus); (2, p 52; 7, p 104 & 315)

1888-1908 Stable building 60'x 29' built on "Farm Campus" on what is now the mall, between Ag Communications Bldg. and Ag Hall. Removed in 1908 (7)

[1]The authors gratefully acknowledge the assistance of Norman R. Underdahl in assembling source material and doing other research used in writing this chapter (4). Permission extended by Leo L. Lemonds to use his book as a reference has also been helpful (1).

[2]Another source gives the location as Nebraska Hall but that could not be because Nebraska Hall was not built until 1887-88 (6, p 315).

(NA)-1908	Small office/laboratory building adjacent to the stable building. Removed in 1908 (7).
1908-1977	Veterinary Hall, directly north of the present East Union (4, 7)
1918-1977	Animal Pathology and Hygiene Complex. Three new buildings added to Veterinary Hall to form a square with courtyard in the center (4).
Completed in 1977 to present	Veterinary Science Complex. Consists of five buildings completed in 1977[3]. Located just east of the (19) northeast corner of the East Campus loop (17).

Early History

At their June 1886 meeting, the Board of Regents ". . . provided for the establishment of an experiment station for the investigation of the diseases of domestic animals . . ." (2, p 52). Appointed to the directorship was Frank S. Billings who had graduated from the Royal Veterinary School of Prussia with honors (1, p 116). This constituted the first full time research position in the College of Agriculture.

Manley (6, p 104) states that the employment of Billings was preliminary to a plan to also establish a school of veterinary medicine, which statement is corroborated by the following: On January 19, 1886, the State Board of Agriculture reacted favorably to a question put to it by Charles E. Bessey, speaking for the University, which was as follows: "Shall the University establish a veterinary school?" Although Bessey announced after getting the Board's endorsement that ". . . the University would at once proceed in the establishment of a Veterinary School," nothing came of the plan (8, pp 21-22).

Billings was well qualified professionally; he was a prodigious worker; he wrote voluminously; but unfortunately he did not differentiate sharply between opinion and facts. He seemed to thrive on controversy and not a small part of his writings was devoted to vilifying his contemporaries.

He carried on a heated controversy with D. E. Salmon, chief of the Bureau of Animal Industries and his associates, each believing that he had isolated the bacterial agent which was the true infectious agent of hog cholera. Eventually, the controversy involved the Secretary of Agriculture, Jermiah Rusk, with Billings accusing the USDA men of treason. In 1903 it was definitely shown that both parties were wrong when Schweinitz and Dorset showed that hog cholera is caused by a virus—not a bacterium. Nothing came of Billings' findings, while the bacterium isolated by Salmon was later found to be the causative agent of diarrhea in pigs, and named Salmonella chaleraesuis, in his honor (1, p 117).

Billings did not limit his sharp barbs to other scientists, for example, he once referred to a former chancellor as ". . . a certain pole-cat whose offensive aroma still pollutes the pure air of Nebraska . . ." (6, p 104).

Billings served from 1886 to 1889 at which time he resigned, later was rehired, serving again from 1891 to 1893.

During the interim, the position was filled by Acting Director Langdon Frothingham. On an extracurricular basis he also coached the first football team in the history of the University of Nebraska (although he was never given the official title of coach). The team played two games, winning from the Omaha YMCA on November 27, 1890, and from Doane College on February 3, 1891. The team was known as the "Old Gold Knights".

Frothingham left Nebraska when Billings returned, whereupon he joined the Harvard Medical School staff (1).

After Billings left the University for the second time, the position was filled from 1894-1909 by A. T. Peters. Peters had graduated from the Konigl Wurtt Tierarztliche Hochschule in Stuttgart, Germany. He started the diagnostic work in the department, a most important service to this day. Other staff members were added to the Department. Excellent work was done in hog cholera, in finding that the cause of cornstalk or sorghum disease was prussic acid, in carrying on free distribution of vaccine against blackleg, in using Pintsch gas to control prairie dogs, and in making numerous other scientific findings (1, pp 119-122).

Peters was followed as head by James H. Gain for the period 1909-1918. Gain was a graduate of the Chicago Veterinary College. Much of the effort of the Department during this period was devoted to the production and distribution of anti-serum for the control of hog cholera (1, pp 122-123).

Up to the time Gain left the University, the practicing veterinarians over the state had become increasingly disenchanted with the Department programs. Most of the veterinarians were graduates of private colleges, having been trained primarily as practitioners. At the same time graduates of the College of Agriculture had a much stronger scientific background along with taking courses in the Depart-

[3]Planning money by 1973 Legislature, followed by additional appropriations in 1974, 1975, and 1976.

ment which were also offered in the private veterinary schools. In a sense they were competing with the established veterinarians. The NE Veterinary Medical Association voiced objections. With Gain's leaving, the Board of Regents wanted a change in direction—to turn the emphasis of the Department to research (1, 4).

The Board secured an excellent individual to carry out their wishes—he was Leunis Van Es who served as head/chairman from 1918-1945. Van Es, who had immigrated to the U.S. from the Netherlands, had earned a degree in veterinary medicine at Ontario Veterinary College and an MD from the Alabama Medical College. Under Van Es the curriculum was changed. The new courses emphasized hygiene, sanitation, disease prevention and veterinary first aid. He promulgated an excellent research program (1).

Van Es was a courtly gentleman, and a truly distinguished educator and scientist. To know him was to respect him. He brought much prestige to the University. During his tenure as head/chairman, the Department grew in size and was highly productive in research. The anti-hog cholera serum plant was closed in 1919. At the direction of the Legislature, this was followed by purchasing, retesting and distributing the serum. In the Station report for 1923 (16, pp 31-32), it was stated ". . . the policy of buying and retesting serum . . . has been continued . . . All virus put out by the State Serum Plant was produced by it with the exception of a small quantity which was purchased to meet a rather sudden heavy demand."

Large quantities of blackleg vaccine were also distributed (1).

So as this section on the early history of the Department comes to a close in 1924, the Department of Animal Pathology and Hygiene was in a strong position under a most capable leader, Van Es.

Teaching

Interest in a UN College of Veterinary Medicine

As we proceed in the history, we find there were numerous inquiries and requests for establishing a college of veterinary medicine. The chief supporters were parents who wanted to get their sons and daughters enrolled in a school granting the doctor of veterinary medicine degree.

In 1955 the Legislature passed a law establishing a "veterinary college," the net result of which was the beginning of a contractual arrangement with various other colleges of veterinary medicine, whereby Nebraska paid what generally amounted to out-of-state tuition for students residing in Nebraska and enrolling in these colleges (1). That arrangement has grown in both numbers and cost per student, and is still in operation today (1987).

Meanwhile, starting in 1973, there was a renewed effort to obtain a college of veterinary medicine, this time through the Old West Regional Commission (federal funds). The initial effort included North and South Dakota, Montana, Wyoming and Nebraska, with a new facility to be built on the East Campus at Lincoln (1).

Following 1973, a great deal of effort on the part of ranchers, farmers, business people and IANR administrators and staff members went into attempting to get the college established. A task force was set up to collect private funds for the proposed facility, with a total of $1.7 million being raised and pledged, and to gain the formal cooperation of some other states (9). The Legislature took a number of steps necessary to establish the college; first, requiring that three other states participate, later two others, and finally only one.

Congress, under a program spearheaded by Congresswoman Virginia Smith of the Third Nebraska Congressional District, made available $12,877,000 for the college, which amount had to be matched by state and private funds. The attempt to establish a full-blown college of veterinary medicine did not materialize because of a lack of the necessary state funds.

However, as of this writing, a plan has been approved by the Regents, the Legislature, and the USDA to construct a joint USDA/UNL facility, a "Center for Advanced Studies in Food Animal Medicine" at RLH US MARC, with $5.5 million redirected federal funds which requires $1.5 million state matching funds. This is a joint venture with Kansas State University whereby Nebraska would offer clinical rotation through the Center for all KSU College of Veterinary Medicine senior students, in exchange for a reduced tuition rate for Nebraska students enrolled in that College (9).

It is now definite that, after 100 years of various attempts, much expenditure of time and money, especially for travel to meetings within the state and to other states by ranchers, farmers and lay persons on the task force[4] and by IANR staff, Nebraska will finally have a joint veterinary college in cooperation with Kansas State University.

Graduate Work (1, 4)

Under Carl Olson, Jr. starting as chairman in 1945, a graduate program was established in the Department. However, the curriculum remained much as it had been developed by Van Es, until George A. Young became chairman in 1956, following which there were a number of important revisions. Courses were added in animal physiology, parasitology, and problems in diagnostic and research technique.

The Department does not now nor has it ever offered an undergraduate major. The first Master of Science degree was granted in 1950, and through 1984, 45 master's degrees had been granted. The Depart-

[4]Many persons donated time and money to the effort, but no one did more than the late William Krejci of Fairmont who spent a great deal of time and his own money in trying to make the college a reality.

ment has not been approved for the granting of the PhD degree; however, 13 students, through cooperative arrangements with other departments and with their principal advisors in veterinary science, have been granted the PhD degree, nine in microbiology and four in parasitology. The first such degree was granted in 1960.

UNL Pre-Vet Club

There is a student club in the Department which was started on March 1, 1967 under the name of "NU Vets". In 1977, the name of the Club was changed to the UNL Pre-Vet Club. The constitution was revised in 1979 and filed with the Campus Activities and Programs (required of all student clubs).

The Club members hold meetings once a month, often having outside speakers for their programs. Other activities have included tours, spring picnics, a spring banquet, and fund raising activities.

Research and Extension Programs

Research and Public Service

During various periods of time the following have been emphasized:

1918-45. Tuberculosis in animals, poultry and man; hemorrhagic septicemia; swine flu; abortions in swine; coccidiosis in sheep; fowl cholera; erysipelas in swine; and parasitic diseases.

1945-56. Added research on listeriosis, hyperkeratosis, mucosal disease, papillomatosis and grass tetany in cattle; and promotion of disease free pigs.

1956-64. Parasites and their interactions with bacteria or viruses; swine flu; exudative epidermities, respiratory diseases of cattle and swine; and disease control in swine through the use of the hysterectomy technique.

1964-76. Transmissible gastroenteritis; parasitic diseases and control with drug therapy; intestinal diseases of calves; and development of the hysterectomy (Caesarean section) method of obtaining germ-free calves.

Programs with Noteworthy Results

Bovine hyperkeratosis (X-disease). In the late forties and early fifties hyperkeratosis (commonly known as X-disease) was causing severe death losses in cattle. A. M. Lee, ARS, USDA, Washington responded to the problem by putting together funding to attempt to determine the cause. As is commonly true in modern research, no one individual or even laboratory, can take credit for the solution to a problem—rather it is a matter of a little progress here, a little more there, and finally someone provides the last piece of necessary information, all of which added together provides the solution.

In the case of hyperkeratosis, Olson, Cook and Brouse showed that X-disease was associated with pelleted feed. Lee demonstrated that a lubricant used in the pelleting machine was the cause and Dennis Sykes, of the University of Tennessee at Knoxville, discovered that it was an additive to the lubricant, consisting of chlorinated naphthalene compounds, which was causing all of the trouble. Once the cause was known, X-disease control was rapid and complete through the manufacturers removing the toxic factor from the grease (1, 10).

Hog cholera (1, 4, 12, 13). With the advent of attenuated and killed vaccines for hog cholera in the forties and fifties, less anti-serum was required. Distribution of anti-serum by the University was discontinued; however, testing and evaluation of vaccines, as required by law, were continued. During the fifties, the disease was again becoming more of a problem as the vaccines were not providing adequate protection.

In 1962, the USDA Animal Health Division adopted a four phase program for the elimination of hog cholera from the U.S. Nebraska's Department of Veterinary Science made a major contribution in this program through Stair et al developing a fluorescent antibody test for the diagnosis of hog cholera virus in tissues, in 1963, followed by a refinement in the test by Aiken et al in 1964. This rapid test became the official one for the eradication procedure and made eradication of hog cholera possible.

By 1974, there had been no case of hog cholera reported in the U.S. for one year. In 1978, Secretary of Agriculture, Bob Bergland, announced that the U.S. was at last hog cholera-free.

Specific pathogene free swine (1, 4, 14). Nebraska is famous for the SPF program in swine, for continuing research, and for obtaining wide-scale application on farms. However, the concept and original research came from the Hormel Institute[5] and the University of Minnesota with the work being done at Austin. Nebraska has one more claim to fame on this program—the initial work in Minnesota was done by George A. Young and Norman R. Underdahl, both of whom, in 1955, joined the Nebraska Department of Veterinary Science where they continued almost uninterruptedly the work they had started at the Hormel Institute.

In 1949, Young and Underdahl, working on enteric diseases of baby pigs at the Hormel Institute, found that naturally farrowed piglets were not satisfactory for the purpose of their research. This was due to previous infections of diseases and the presence of antibodies from the colostrum. Pigs taken from the sow prior to nursing generally died.

At Underdahl's suggestion, the scientists first tried catching the pigs at birth in sterile cloth bags and removing them directly to sterilized isolation quarters. The plan worked but it was cumbersome and time

[5]The Hormel Institute was established in 1942 as a research unit of the graduate school of the University of Minnesota and was located on the Jay C. Hormel estate at Austin, Minnesota (14, pp 4, 5).

consuming. Farrowing usually took place at night and by the time the scientists were called and reached the farrowing sow, part of the pigs had been dropped, thus only part of the litter could be obtained on a disease-free basis.

One night while in bed, Young was thinking about how the method could be improved. Suddenly he hit upon the idea of taking the sow to the Hormel plant where the normal procedure was to anaesthetize hogs with carbon dioxide, remove the uterus containing the pigs to a clean area, remove the piglets from the uterus under sterile conditions, and place them in Horsfall units[6]. Meanwhile the incision on the sow was sewed up and the carcass was returned to the regular kill processing line.

The concept was first put to an actual test in May 1952. Voila—it worked! Two of the 11 pig litter lived. Numerous refinements followed, and the hysterectomy technique, with the refinements, is still used in many laboratories today. Young and Underdahl continued their work at the Hormel Institute until 1955 when they joined the staff at Nebraska. Young continued his research until 1964, when, at the age of 47, he died of a heart attack while at work at his desk in the Department. Underdahl carried on until 1983, when he retired from the University.

As indicated above, the colostrum-deprived, antibody-devoid pig obtained by hysterectomy and more recently in many laboratories by hysterotomy (Caesarean), was originally intended to be used as a research animal. Pigs so obtained and grown to the desired age in isolation are free of antibodies because they do not receive colostrum from the mother. Because the disease-cycle has been broken, they are also free of such diseases as: Brucellois; Dysentery or "bloody scours"; Gastroenteritis (TGE); Leptospirosis; Pneumonia (VVP or mycoplasmal); Pseudorabies; Parasites - lice and mange; and possibly still others for which there are no known diagnostic tests.

The surgically-derived pigs have been and are being used to conduct studies on numerous diseases including respiratory, enteric, systemic, and parasitic diseases, at the UNL and at many other laboratories.

An example of the importance of serendipity in research was the concept of the application of the SPF system in the production of hogs on the farm. In 1951-52, Young suggested that it might be possible to avoid the necessity of expensive housing for hog production by using disease-free environment for young swine, and then providing ordinary farm facilities for the brood stock (15). In 1953 he enlarged upon the concept by stating that the technique could be used to clean up disease in valuable blood lines. While the small pigs, obtained by surgical removal, were in the brooder, all remaining pigs on the farm would be removed, the premises and equipment would be thoroughly cleaned, and the SPF pigs would be brought to the same farm. A break in the swine-to-swine disease transfer would thus be accomplished (16).

Repopulation of chronically infested herds with disease-free pigs was started at the Hormel Institute. After Young and Underdahl came to Nebraska, Department of Animal Husbandry University herds were repopulated with SPF hogs at Lincoln, starting in 1956, and at the North Platte Experiment Station in 1959 (4).

In 1959 Guy McReynolds of Ashland was the first Nebraska purebred producer to repopulate his farm. He was followed by Willard Waldo of DeWitt in February 1960, and by John and James Volk of Battle Creek in the fall of 1960. All four producers are still active in the SPF program (4).

Nurtured by the College of Agriculture, the Nebraska Swine Accrediting Agency was established by the SPF producers in 1960 to govern accreditation of SPF herds. It is supported by fees collected from the member producers, with offices and diagnostic services provided by the IANR. In 1979 there were 70 member producers with a total of 57,134 pigs farrowed from 6,143 litters. There is also a National SPF Accrediting Agency which in August 1971 consisted of 20 state associations (including Nebraska). The SPF concept has also had broad international acceptance (1, 4).

Calf scours (4, 5, 17). Calf scours had been a serious disease in Nebraska for many years, oftentimes resulting in death of young calves. The 1967 Legislature made an appropriation of $25,000 for the Department to attempt to develop a vaccine to control this disease.

Utilizing the specially appropriated funds was undertaken by a team consisting of Charles A. Mebus, Marvin J. Twiehaus, Marvin B. Rhodes, and Norman R. Underdahl. The researchers found that the causal organism was rotavirus which could be controlled to a considerable extent by a vaccine. The team wrote up their findings and submitted the article to the *Veterinary Research Journal*. The manuscript was rejected by the *Journal* on the basis of lacking adequate repetition of the results.

In order to protect patent rights, the authors thereupon asked the AES to publish the article as a research bulletin. This was done with the publication being given number one priority in order to get the results in print at the earliest possible moment. A great demand followed for the bulletin worldwide, necessitating a second printing, and even so it is out-of-print today.

The vaccine was patented and arrangements were made with Norden Laboratories to produce it on a commercial scale. Later a Corona Virus was isolated in calf scours and was incorporated in the vaccine. From the beginning and continuing today, Norden Laboratories pays a royalty to the University on all of the vaccine marketed.

Following the findings in Nebraska, Rotavirus was

[6]Horsfall units provide sterile conditions.

isolated from the feces of man and many other animal species. It was found to be the cause of enteritus, which is an extremely important debilitating disease of babies in the less developed countries. Rotavirus has been the subject of 274 scientific papers published by scientists worldwide from 1973-1979, and 1,237 from 1980-1986. A prestigious paper authored by scientists from Finland, Belgium and England was published in August 1985 on the subject of vaccinating human infants against Rotavirus, the bovine virus isolated by the Department of Veterinary Science (4, 5, 17).

Gnotobiotics (4). Another research accomplishment was the development of equipment and techniques for raising gnotobiotic calves, and refinement in the production of gnotobiotic pigs.

Diagnostic Laboratories and Extension Specialists (1)

Diagnostic services in the Department were well underway by 1924 in which year 1409 diagnostic tests were conducted (1, p 125). Additional diagnostic laboratories were established at the North Platte Experiment Station in 1969 and at the Panhandle Experiment Station in 1976.

Although Extension activities had been carried on by the Department from its inception, the first Extension Pathologist, so designated and funded, was S. W. Alford. When the hog cholera serum plant was closed in 1938, he was transferred to a newly created position in the Department of Animal Husbandry. O. D. Grace was appointed part time extension specialist in the Department in 1955, followed by the full time appointment of E. Crosby Howe in 1957. With the establishment of the diagnostic laboratories at the North Platte and Panhandle Stations, Extension specialists were employed at those locations. A second full time Extension specialist was added to the staff at Lincoln in 1974.

In the earlier years, county extension agents did considerable vaccinating of hogs. This practice was generally frowned upon by the practicing veterinarians and, in time, was discontinued.

International Programs

Staff members who served with the Nebraska Mission in Colombia were Harry C. Mussman, Benny B. Norman, Kenneth S. Preston, Jay H. Sautter, L. G. Tritschler, Theodore Vera and William A. Wolff.

Those staff who served with the Technical Assistance Program in Turkey were Fred F. McKenzie and Bennett T. Simms.

Cooperation with Nebraska Agencies (4)

The Department cooperated with the State Veterinarian's office in the eradication of hog cholera doing all the fluorescent testing for diagnosis of the disease necessary in disposal of infected herds.

Presently the Department does the testing for pseudorabies diagnosis and certification of pseudorabies-free herds, for the State.

Support from Charitable Foundations

The National Foundation March of Dimes made a grant in the early sixties to George A. Young and E. L. Stair to conduct a study to determine if viral (including a number of viruses) infection during pregnancy might increase the chances of miscarriage or a defective fetus. The experiments were conducted with minipigs, with the hope of uncovering clues with implications for human beings (18).

Staff Recognition (4)

Receiving honorary doctorate degrees

Leunis Van Es - University of Pennsylvania	1935
North Dakota State University	1946

Receiving Distinguished Service to Agriculture award by the Honor Society of Agriculture - Gamma Sigma Delta

George A. Young	1962

University of Nebraska Regents Professorship

George A. Young	1962

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Chapter 19. Quasi-Departments

Contents

There are four academic administrative units within the IANR located on either the East Campus or the City Campus which carry the title of Center or Programs. These are in addition to the four Research and Extension Centers located off-campus plus the one located on the East Campus. In addition there is the Office of Finance & Personnel. Each of these five units is discussed briefly in the sections which follow.

Academic Units

Section 1. Biometrics and Information Systems Center

Contents

Names of Unit

Statistical Laboratory	1955-1976	Biometrics & Information Systems Center	1976-present

Administrators

Name	Title	Period Served
Fred C. Andrews	Assistant Statistician, College of Agriculture (1)	1955-1957
Charles O. Gardner	Station Statistician (2)	1957-1958
Charles O. Gardner	Chairman	1958-1968
Wilfred M. Schutz	Head	1968-1976
Wilfred M. Schutz	Head, BISC, and Computer Director, IANR	1976-1987
Walter W. Stroup	Acting Head	1987-present

Locations on Campus

Name of Building	Years Occupied
Agricultural Administrative Annex	1955-1958
Chemurgy Building	1958-1959
Crops Laboratory	1959-1969
Miller Hall (formerly Animal Husbandry Hall)	1969-present

Origin and Development

Personnel

Fred C. Andrews was hired on a half-time appointment in the Station in 1955, primarily to assist the researchers in planning their experiments so that they would yield maximum information and the data obtained could be summarized with appropriate statistical analyses. Statistics was a very rapidly growing field and most of the Station staff at that time had little formal training in this area. Now, for the first time in the history of the Station, the staff had officially a person they could consult with on the statistical aspects of their experimental work.

Andrews shared an office area in the old Agricultural Administrative Annex building with Ralston J. Graham, then associate chairman of the newly created Department of Information. Andrews was provided with a secretary/data analyzer, a typewriter and one electric Monroe desk calculator (3). The secretary/data analyzer was Joyce Menzie Villena who remained with the Laboratory until 1965.

Andrews was trained as a mathematical statistician, and in fact, while at Nebraska he was also on the staff of the Department of Mathematics in the College of Arts and Sciences. It was not easy at that time to bridge the gap between research programs of the Station staff, most of whom held degrees in some agricultural field, on the one hand, and the background of a mathematical statistician, on the other. However, Andrews was able to communicate effectively with the Station staff and to help them with their problems. He was well liked and carried out his assignment in a highly capable manner. However, the assignment in the Station did not help him much professionally and he resigned in 1957.

With Andrews leaving, the College of Agriculture persuaded Charles O. Gardner to accept the position of Station Statistician. Gardner, a native Nebraskan, had graduated from the UN College of Agriculture. Following graduation he enrolled in Harvard University where he earned a MBA degree. He then received a commission in the Quartermaster Corps of the U.S. Army. Following the close of the War, he returned to Nebraska where he earned a master's degree in agronomy and worked as an extension agronomist before departing for North Carolina State University. There he earned the PhD degree, with a major in agronomy and a minor in statistics[1]. He returned to Nebraska to work in the area of quantitative genetics in agronomy, filling the position made vacant by the retirement of T. A. Kiesselbach.

Gardner was an ideal person for the Statistical Laboratory position. He was one of relatively few agricultural scientists available at the time who had a strong academic background in both agricultural research and statistics. He also possessed the human qualities of patience and empathy with his fellowman—so necessary at the time since most of the Station staff had had little or no training in statistics and would have hesitated to take their problems to a statistician with less patience and understanding of their level of competence in statistics. They would have shunned away from most mathematical statisticians—what they needed was help in applied statistics.

The load in the Statistical Laboratory grew rapidly. Rather soon there was more demand on Gardner's time than he had available. Therefore, arrangements were made to have L. A. Swiger, who had been a member of the USDA Animal Husbandry staff, join Gardner in the Statistical Laboratory on a full time basis in 1960. When Swiger left the University in 1964, he was replaced by Robert F. Mumm.

In 1968 Gardner, who had meanwhile continued his research in the Agronomy Department, along with teaching courses and directing the Statistical Laboratory, asked to be relieved of the latter assignment in order to concentrate more of his time on quantitative genetics research. Accordingly, he was replaced by another UNL Alumnus, Wilfred M. Schutz, who had also obtained his PhD degree at North Carolina State University with a joint major in genetics and statistics. Schutz, like Gardner and Andrews before him, possessed both the excellent technical capabilities and the human qualities necessary to make the operation, of what is now the Center, successful. Like Gardner and Mumm before him, Schutz was also appointed to the staff of the Agronomy Department.

In 1972, Anne M. Parkhurst was added to the Statistical Laboratory staff with a joint appointment in the Department of Food Science and Technology.

Equipment

The progress that has been made in computer equipment since the establishment of the Laboratory in 1955 almost defies the imagination. By today's standards, the original piece of calculating equipment, an electric Monroe desk calculator, seems primitive indeed.

The succession of equipment employed has been:

a) Hardware: Monroe desk calculator from the start; IBM 402 Tabulator (beginning in the fifties); IBM 1620 in 1961; IBM 1130 in 1967; IBM System 34 in 1981, and the IBM 4381 from 1986 to present. IANR computer users communicate with the IBM 4381 and other computers on the City Campus and in the State House via a recently installed IANR computer network.

b) Data entry equipment: Keypunch came in with the IBM 402 Tabulator, followed successively by the 026 keypunch, the 029 and finally with the presently used 3741 floppy diskettes.

The computer terminal equipment was started with two IBM 2741 terminals, followed by the present

[1]North Carolina State was, at the time, one of the leading land grant universities in teaching and applying statistics in agricultural research.

Deckwriter terminals, color CRT terminals, and microcomputers workstations. There are also satellite terminals and microcomputer facilities in the C. Y. Thompson Library, Marvel L. Baker Hall, and the Plant Science Building, along with individual terminals and microcomputers in various Departments.

Teaching

As stated earlier, up to the time of the establishment of the Statistical Laboratory, the majority of the Station staff had had relatively little academic training in the use of statistics in research. Much of the knowledge of statistics among the staff was gained by working and consulting with other staff members who had some academic training in the field and/or were self-taught.

The subject of statistics was included in a course in animal hygiene and sanitation in the Department of Animal Pathology and Hygiene as early as 1919. The subject was described as: "The value of statistical inquiry to livestock sanitation. Statistical methods and interpretation of statistics" (5). The first courses devoted primarily to statistics or closely related fields were biometry, starting in 1934-35, and experimental design and statistical interpretation, starting in 1948-1949, both being offered in the Agronomy Department.

The Agronomy Department was fortunate in the thirties and forties in having on the staff three USDA staff members, H. M. Tysdal, Karl Quisenberry, and Bliss Crandall, all of whom had had course work in statistics and, considering the "state of the art" at that time, were advanced in employment of statistics in their research. All three counseled their fellow staff members and did some classroom teaching of biometry and experimental design. The last of this group, Crandall, left Nebraska in 1947. Following their departure another USDA Agronomy staff member, Laurence C. Newell, filled the void in teaching and counseling in the field of experimental design. Still others taught biometry, with John Lonnquist being the last person to teach the course until Gardner joined the Agronomy Department in 1952.

Statistics in the Department of Animal Science received an impetus when Cecil T. Blunn was hired in 1945. He too taught courses and counseled other staff members on experimental design and biometrics. Some statistics was also taught in still other departments. As the Statistical Laboratory grew, Laboratory staff members gradually took over most of the teaching of statistics although the courses continued to be listed in the other departments.

Although the staff is heavily involved in teaching, especially at the graduate level, it is not possible to major in statistics in the College of Agriculture at the undergraduate level nor to obtain an advanced degree in this quasi-department. Students wishing to emphasize statistics in their graduate work utilize the Center staff as advisors but must obtain their degrees officially in other departments.

Research

The Center is primarily a service unit for other IANR staff members. However, all of the Center staff members are involved directly in research projects, most (but not all) of which are carried on jointly with staff members in other departments.

Evaluation

The Statistical Laboratory/Biometrics and Information Systems Center is today a vital unit in the IANR—to attempt to operate without these services would be unthinkable. The growth and changes in the Center over the years reflect the development of technology and its impact on the IANR. They also represent the continuous upgrading of all of the IANR staff with respect to employment of statistics in their programs. Today, most staff members do their own programming, made possible in part by the fact they continue to take classes and short courses in statistics and computing.

Teaching and information processing activities have grown in importance over the years, and in all probability will continue to do so in the future.

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[2]Information on Resident Instruction, for students and prospective students.

Section 2. Nebraska Water Resources Center[1]

Contents

Names of Unit

Nebraska Water Resources Research Institute	1964-1975
Nebraska Water Resources Center	1975-present

Administrators

Name	Title	Period Served
Eugene C. Reed[2]	Director	1964-1968
Warren Viessman, Jr.	Director	1968-1975
M. Wayne Hall	Director	1975-1978
Gary L. Lewis	Interim Director	1978-1980
Deon D. Axthelm	Acting Director	1980
William L. Powers	Director	1980-present

Headquarters Locations

Nebraska Hall, Room 113	1964-1968
Agricultural Engineering Bldg., Room 212	1968-1975
Agricultural Hall, Room 310[3]	1975-1985
Nebraska Hall, Room 113	1985-present

Origin, Administration, and Funding (1, 2)

The Institute/Center was established at the University of Nebraska in November 1964 to attempt to take advantage of federal funds which became available in 1965. The Water Resources Research Act, PL 88-379, was signed into law by President Lyndon Johnson on July 17, 1964. The legislation was enacted following numerous studies dating back to the latter forties. Stork and Miller (2) pointed out that "Recurring themes appearing in those studies included: 1) a need for water scientists in a broad range of disciplines; 2) a need to expand both basic and applied research efforts for increasing water supplies and enhancing water conservation; 3) a need to catalog research projects and to coordinate federal activities and programs ... Dr. Abel Wolman, author of the report 'Water Resources' for the National Academy of Sciences, commented that 'there is no institutional structure to take care of multidisciplinary research, and it is far easier to get approval for costly new projects than for education and research'. Generally, it was concluded that more than a federal research program was needed and that research centers should be located in the states."

The Nebraska Water Resources Research Institute established at the University in November 1964, was placed administratively directly under the Chancellor, making it independent of any Department or College. The principal reason for this arrangement was that the functions and interests of the Institute cut across subject matter lines of established Departments and Colleges. On April 1, 1974, the Institute (now the Center) was placed administratively into the IANR.

Federal funds made available to the states under PL 88-379 have always been administered by the Department of Interior. Of the 43 requests for the initial allocations, 14 states were announced on January 16, 1965 as being the recipients of available funds. The 14 included Colorado and Missouri but not Nebraska.

Not being included in the initial 14 recipients constituted possible oversight, if not an outright affront, as far as Nebraskans were concerned since Nebraska has always considered itself a very important state with respect to water resources.

Donald Leedy, of the Department of Interior, Washington, D. C. stated at a meeting of Station workers at Lincoln on February 5, 1965 that he knew of no reason why Nebraska failed to receive funds for its Institute. He also said that requests had been made for additional federal appropriations, so that funds could be made to states other than the initial 14 (5). The situation was remedied with federal funds being made available to the University in fiscal 1967.

Initial funding was entirely federal, with the state starting to provide some financial support in 1972. It

[1]William L. Powers kindly provided published reports and guidance to the authors in writing this portion of this book.

[2]Part time in this position. Also director of the Conservation & Survey Division.

[3]The Center was also assigned space in the College Activities Building from 1982 to 1985.

was not until fiscal 1977 that state support exceeded federal support. The Institute began to receive outside funds through grants and contracts in fiscal 1974. Today the amount of funds from the above three sources rank in declining amounts as follows: 1) state tax support; 2) grants and contracts, and 3) federal funding (2).

Purpose of Programs

The purpose of the Center ". . . is to bring together water researchers, users and funding sources. It integrates University water research and training programs with the needs and efforts of federal, state and local agencies and the public" (3).

The programs consist of providing funds for research outside of the Center, for administering and coordinating research projects, and for teaching and information dissemination (2).

Research (2)

The Center covers many areas of water research, including technical, legal, political, economic and social aspects (2). Irrigation scheduling is an example of the research programs funded in part by the Center. Through this research it was found that with proper scheduling irrigators could reduce the amount of water applied and energy used by 25 to 35 percent.

The first grant made by the Center for research within the UNL was for instrumentation equipment for the climatology research site at the UNL Field Laboratory at Mead. Subsequent grants helped make possible the establishment of the Center for Agricultural Meteorology & Climatology as a segment of the IANR.

Another example of research supported by the Center was that on the problem of eutrophication, such as excessive growth of unwanted plants, especially algae, in shallow waters of lakes which are high in nutrients, especially phosphates. The traditional means of control has been treatment with chemicals, primarily copper sulfate, which is expensive and may result in undesirable side effects. The Center has been attempting to find a successful means of biological control.

Training and Education

Training and education have constituted an important segment of the Center activities. It is now possible for an undergraduate student in the College of Agriculture to obtain a major in the water resources option of the Natural Resources curriculum (4). Graduate students have been supported by the Center in 28 different disciplines scattered over a number of Colleges of the UNL (2).

Other Services and Programs (2)

Other services and programs of the Center include: a) dissemination of information through scientific and popular publications and press releases; b) sponsoring annually the Nebraska Water Conference and the Water Resources Seminar; c) issuing regularly three different directories; d) being involved in research and evaluation of state water policy alternatives to facilitate decision making; and e) serving as the home office and having the Director serve as the executive secretary of the Universities Council on Water Resources (consisting of 80 universities) (2).

References

1. Powers, William L. July 1986. Personal communication. NWRC, IANR, UNL.
2. Stork, Karen and Susan Miller. Fall 1984. Nebraska Water Resources Center, a 20-year report. IANR, UNL.
3. Nebraska Water Resources Center. Dec 1980. 1980 Annual Report. NWRC, IANR, UNL.
4. UNL Undergraduate Bulletin. 1986. 1(1).
5. Lincoln Evening Journal and Nebr State Journal. Feb 5, 1965. Lack of water study funds prompts appropriation bill. Lincoln, NE.

Section 3. Environmental Programs

Environmental Programs was established as an administrative unit within the IANR in August 1977. It was headquartered in the Natural Resources Hall (formerly the main building of the old Veterinary Science Complex). The title of the administrator has been and continues to be "coordinator", a position which has been held from the start by Roger E. Gold. In 1985 Gold also became head of the Department of Entomology. The unit has responsibilities in Extension, the Station, and the College (RI). The purpose of the Programs is ". . . to coordinate environmental activities within the Institute . . . in pest management, training of pesticide applicators, waste disposal, pollution control, and other related areas" (1).

Reference

1. Gold, Roger E. Undated. Environmental education within the IANR, UNL. Environmental education in action— II. Case studies of environmental studies programs in colleges and universities today. ERIC/SMEAC Center for Science, mathematics and Environmental Education.

Section 4. Center for Agricultural Meteorology & Climatology

Contents

Early Work on Solar Radiation (1)

Some of the early work in climatology at the Uni-

versity of Nebraska College of Agriculture, other than keeping routine weather records, was carried on by William D. Bancroft. A retired Baptist Minister, he was hired by the U. S. Weather Bureau in about 1920 as a weather observer. He was officed in Experiment Station Hall on the roof of which he had the weather instruments. In addition to maintaining the traditional weather records, he did pioneering work on solar radiation. Bancroft retired from this position in the early 30's.

Climatological Programs in the Department of Agronomy (2, 3, 6)

From T. H. Goodding's time (he joined the agronomy staff in 1917) to this day, some material on climatology has been included in the beginning agronomy course.

In the academic year of 1937-39, Goodding started teaching a course entitled "cropping practices". The course description in the College of Agriculture catalog included the statement ". . . giving special attention to the soil, adaptation, biological, ecological and climatic factors". The course continued to be taught under various numbers, with the name being changed to "crop ecology" in 1947-48. First Milo L. Cox succeeded Goodding and later William L. Colville succeeded Cox as instructors, but the course description remained the same through 1963-64. In the 1964-65 catalog the name of the course was changed to "crop ecology and production", and for the first time the old course description was altered. However, material on climatology continued to be included through the 1978-80 biennium. In 1980 the name of the course was changed to "field crop physiology", and climatology was no longer mentioned in the course description.

William Colville who had taken a number of courses in agricultural climatology and had minored in ecology in his graduate work, carried on phenological research while at Nebraska (1957-71), as a part of his broader field of crop production studies. The research was part of a regional project, NC-26, entitled "Weather Information for Agriculture", which included a phenological objective. Persian lilac (Syringa persica) was used as the indicator plant. Clones from the same parent stock were used in making the plantings in the 12 north central states. In July 1970, the north central project was combined with a similar one in the northeast region, under the title of "Atmospheric Influences on Ecosystems and Satellite Sensing". The project is still underway, with Nebraska having the lilac indicator plantings in seven locations over the state (3, 7).

Work in Horticulture and Forestry (2, 4)

In 1961, Norman J. Rosenberg joined the Department of Horticulture and Forestry as an agricultural meteorologist. In 1962-63, the Department for the first time offered a course entitled "crop response to environment" taught by Rosenberg and F. G. Teubner. In the next year another course entitled "agricultural climatology" was offered which was taught by Rosenberg. Agricultural climatological and meteorological research was also initiated in 1961. The work in this general area grew, and in the early 70's there was established in the Department a section of agricultural meteorology and climatology.

Work in Agricultural Engineering and Establishment of the Center (4, 5, 6)

In 1975, the three staff members working in this area were assigned to the newly created agricultural meteorology section of the Department of Agricultural Engineering. With the termination in 1973 of the National Weather Service State Climatology Program, the work was shifted on a reduced basis to the Nebraska State Climatology Office under the Conservation and Survey Division. In 1979 the Board of Regents established the Center for Agricultural Meteorology and Climatology (CAMaC), which included a combination of the agricultural meteorology sections and the Nebraska State Climatology Office, with Norman J. Rosenberg[4] as director. Headquarters for the unit continues to be in the L. W. Chase Hall.

Today the Center has a faculty of six staff members plus an adjunct faculty of four, and one jointly-appointed staff member from the Department of Horticulture. Research is conducted in 10 principal areas and the MS and PhD degrees are offered through departments in the Colleges of Agriculture, and Engineering and Technology. Courses in this general area are taught in a number of departments in the Colleges of Agriculture and Arts and Sciences. CAMaC also houses a comprehensive climate data archive for Nebraska and the surrounding region.

Staff Recognition

In 1981 Norman J. Rosenberg was appointed a Regents Professor by the Board of Regents of the UN.

References

1. Bancroft, Paul M., M.D. Nov 13, 1986. Personal communication. Lincoln, NE.
2. Col of Agric (resident instruction) bulletins. Col of Agric, UN, Lincoln.
3. Colville, William L. Nov 13, 1986. Personal communication. Dept of Agron, Univ of Georgia, Athens.
4. Rosenberg, Norman J. Nov 10, 1986. Personal communication. CAMac, IANR, UNL.
5. ———. Fall 1979. Climatology Center prepares for the future. Farm, Ranch, and Home Quarterly. IANR, UNL.
6. UNL Undergraduate Bulletin. 1986. UNL, 1(1).

[4]As this book goes to press (1987) announcement has been made that Rosenberg is retiring from the UNL and will head Resources for the Future's newly formed Climate Resources Program in Washington, D. C. (9).

7. Hopp, R. J., et al. June 1972. Regional phenological studies with Persian lilac (Syringa persica). New York's food and life sciences bulletin No. 17. New York State Agricultural Experiment Station, Geneva.
8. Publications. Center for Ag Meteorology and Climatology. CAMaC special report 86-1. IANR, UNL.
9. People. June 1987. Agronomy News, p 7. American Society of Agronomy. Madison, Wisc.

Non-Academic Unit

Section 1. Business, Finance and Personnel

Contents

Names of the Unit

This administrative unit started as the Office of Personnel and Finance, later it was known as Business and Finance, and now is referred to as the IANR Finance and Personnel Office.

Location on Campus

The IANR Finance and Personnel Office since its inception has been in Agricultural Hall.

Development of the Unit and Present Status

Up until 1966, there were two administrative units in the College of Agriculture handling business, finance, and personnel matters. One of these was the "finance office", in close proximity to the Dean's office which handled these matters for the Station, the College (RI), and the International Division. The other unit, in close proximity to the office of the Director of Extension, handled similar matters for that Division.

In his efforts to obtain a closer integration between Extension and the other Divisions of the College, Frolik in 1966 prevailed upon Extension Director Adams to agree to the establishment of an overall business office for all of the College Divisions. Accordingly, on November 1, 1966, the new administrative unit was established, with Walter E. Spilker being placed in charge with the title of Personnel and Finance Officer-College of Agriculture and Home Economics. When Spilker retired August 1, 1970, he was replaced by Charles H. Koopman. Koopman resigned in 1977, and was succeeded by Alan R. Moeller. Moeller holds the title of Assistant to the Vice Chancellor for Finance and Personnel.

As the College of Agriculture/IANR has grown in size and complexity, the Finance and Personnel unit has had to add personnel. The work is assigned according to skills, rather than by Divisions. Also the operations are now completely computerized. The unit provides excellent service for the IANR administration and staff, and is well synchronized with the appropriate related units at the UNL administrative level.

Administrators

Name	Title	Period Served
Walter E. Spilker	Personnel & Finance Officer	1966-1970
Charles H. Koopman	Business & Finance Officer	1970-1974
Charles H. Koopman	Asst. to Vice Chancellor (Office of Finance & Personnel)	1974-1977
Alan R. Moeller	Asst. to Vice Chancellor for Finance & Personnel	1977-present

Chapter 20. Liaison with Administrative Units Outside the College of Agriculture/IANR

Contents

Colleges, Schools and Departments

Early History

Much of the research and educational work in the College of Agriculture had its roots in basic disciplines in other colleges and their respective departments.

Resident Instruction. Agriculture and Home Economics have had a dichotomous development within the University framework, from the basic disciplines on the one hand, and husbandry and practice on the other. In the early years at the University of Nebraska the former predominated (see Part II, Chapter 2). Of courses listed in 1874, 29 were outside of agriculture and 10 were within the College. There were no electives — everyone took the same courses (1).

Research. The early research was conducted chiefly by staff members trained in the basic disciplines and some of the early experimentation tended to be rather empirical in nature.

Dean Charles E. Bessey, in 1884, outlined two types of research that could be conducted in agriculture, one being basic and the other applied (2, pp 50-51). A man of great intellect and foresight, Bessey recognized that basic research could and would be conducted by agricultural scientists along with the applied type which utilizes and builds on basic knowledge but does not necessarily add to it.

There developed a trend of placing increasing emphasis on husbandry, practice and management. However, the trend was gradually reversed as the researchers once more turned to the basic disciplines. As the years went along the terms "husbandry" and "rural" disappeared from the departmental names. Of the 15 agricultural departments in existence in 1974, five included the word "agricultural" in the departmental name.

Extension. Extension has traditionally been heavily (but not exclusively) geared to doing educational work in agriculture and home economics. This was true of the earliest Extension-type programs, such as the Farmers' Institutes which were started in 1873-74 (3, p 62). The chief function of Extension has been, and continues to be, to make research findings in agriculture and home economics available to the general public. It has been somewhat more removed from the other colleges in the University than were classroom instructors and researchers, however this is changing.

After 1924

Resident Instruction. Students in the College of Agriculture have traditionally taken many courses taught by instructors in UN colleges and schools outside of the College of Agriculture. A partial list of such courses has been included in the College of Agriculture bulletins which list was described in 1984-86 as a ". . . partial list of courses offered in other colleges. Most of these are required in some major or option. Many courses in other colleges are open to students in the College of Agriculture" (4).

Courses in other colleges listed in the 1924-25 College Bulletin outnumbered those in agriculture and home economics by 15 to 11.

An interesting observation is that, until 1945-46, there was little distinction made in listings in the Bulletins of the College of Agriculture between courses taught by College of Agriculture staff and those taught by staff from other colleges. These "outside" departments/disciplines were interspersed alphabetically with the College of Agriculture departments/group majors (4).

Beginning with the Bulletin for 1946-47, courses taught by faculty from colleges other than the College of Agriculture were listed in a special section of the College bulletins. Starting with the *1986 UNL Undergraduate Bulletin* (all colleges combined in one catalog), course requirements from the entire UNL are listed under department write-ups, respectively (6).

Research and Extension. Agricultural scientists have tended, over the years, to increasingly generate their own basic knowledge and research methodologies. However, they continue to maintain fairly close liaison with staff in related disciplines in other UNL colleges.

Extension has tended to broaden its scope of programs beyond agriculture and home economics and has, accordingly, moved somewhat in the direction of

utilizing more non-agriculture/home economics disciplines than was formerly the case.

Involvement of City Campus Staff

Instruction. Over the years there have been a number of other UNL college staff members headquartered on the East Campus. In chemistry there was Roscoe C. Abbott (1916-1954), an excellent and demanding teacher but not always popular, especially with the less than highly capable students. He was followed by Pauline N. Doryland who taught on the Campus until 1976.

Russell T. Prescott (1924-1942) English professor, expected his students to be able to read and comprehend literature, and to write acceptable themes. He failed some of the farm boys who were otherwise fair to good students but whose forte was not English. Prescott was basically an excellent teacher and mellowed somewhat as the years went along. In time he also assumed the duties of the Station editor. Prescott was followed by Martin Severin Peterson, who also held the dual positions. Peterson spent only a few years on the East Campus, leaving in 1946. He was followed by English instructor Mabel Strong (1947-1958) and she, in turn, by Jean Aiken (1961-68). Aiken continued teaching until 1964 when teaching of English was discontinued on East Campus, at which time she transferred to the Department of Agricultural Communications. Carl E. Rosenquist, after some years absence, returned to the East Campus where he taught beginning botany until his retirement in 1972.

There were also College of Arts and Sciences staff members, headquartered in their respective departments, who were heavily involved in teaching students in the College of Agriculture. Teaching was done on both the East Campus and City Campus. Examples were:

Raymond J. Pool (1907-1957) taught beginning botany. He was a scholar and a gentleman, and an inspiration to freshmen students.

John E. Weaver (1923-1952) was a world renowned plant ecologist. He contributed greatly to developing graduate students in their efforts to become scientists. Not a few students, who did graduate work in range management in agronomy, came to Nebraska because of Weaver.

D. D. Whitney (1923-1965) was a delightful zoology teacher. His Yankee brogue and his dry sense of humor made attending zoology class more entertaining than cutting class and going to a matinee movie (a fairly popular student custom of the time)[1].

Carl E. Georgi (1935-1980) taught "agricultural microbiology", which oriented the subject matter to students in the College of Agriculture. He was an inspirational teacher, candid almost to a fault, and had excellent liaison with the College of Agriculture faculty.

Walter Militzer (1936 to 1974), a popular professor, taught biochemistry, which was so important to many College of Agriculture students. He made a difficult subject both readily understandable and interesting.

Harry Lloyd Weaver (1946-1971) was an excellent teacher of plant anatomy and cytology. He did much to prepare students for genetics and cytogenetics at the graduate level. He possessed an unusual empathy with students.

Joint appointments. There were some, not many, joint appointments of staff members involving the two Colleges. Typically, these consisted of teachers in the A&S College who held summer appointments in the Station. Examples were Calvin McMillan (1952-1958), botany/agronomy; and W. Winfred Ray (1947-1972) botany/plant pathology; and Harry Lloyd Weaver, botany/agronomy.

From East Campus to City Campus. In a few cases, College of Agriculture staff members transferred to departments on the City Campus. Examples were R. P. Crawford from agricultural journalism and serving as Station editor to the Department of Journalism; Bert Evans from Ag Economics to Economics; Richard L. Fleming from agricultural communications to Department of Public Relations (and later back to agricultural communications); Rufus H. Moore from horticulture and forestry to botany; Ray F. Morgan from dairy science to journalism (largely because of his unusual photographic knowledge and skills); George L. Peltier from chairman of plant pathology to chairman of bacteriology; and George Round (in part) from agricultural communications to the Department of Public Relations.

Graduate Studies

Graduate work is important in the College of Agriculture, as will be noted in the departmental chapters on the large numbers of advanced degrees which have been granted. The graduate training helps to prepare students for professional positions, and also contributes to the research production of the Station.

"Graduate instruction in the University began in 1886[2]. In 1896 a Graduate School was organized with a designated faculty under the direction of a dean. By an amendment to the charter of the University in 1909, the Graduate School became the Graduate College.

[1]Whitney warned his students at the beginning of each semester that he was "death" on sleepers. The traditional punishment for anyone caught was writing a 1000 word essay on "sleep".

[2]There is some disagreement in published documents as to when graduate work was started at the University of Nebraska. Manley has stated (7, p 94) "Graduate work in the University had begun almost unnoticed in 1882 when Professor (George E.) Howard's wife and another young woman asked for and received advanced courses in history . . . In June, 1883, the regents authorized the department to develop courses leading to a M.A., but since the teaching force was limited, nothing was done . . . the 1885-1886 catalog . . . announced formal graduate study in Latin, Sanskrit, mathematics and civil engineering, history, chemistry, and natural sciences . . ."

". . . The dean for Graduate Studies is responsible for coordinating and administering graduate-level programs and policies at the UNL. The UNL dean for Graduate Studies also maintains a close liaison relationship with the executive dean of the Graduate College of the University" (5, p 17).

The dean of the College of Agriculture does not administer graduate work in the College—the chain of command in these programs is from the individual faculty member - to department head - to the UNL dean for Graduate Studies. However, the budget for graduate work in agriculture, including graduate faculty salaries, remains with the College of Agriculture.

C. Y. Thompson Library[3]

Administrative Structure

The C. Y. Thompson Library and the former College of Agriculture Library, located on the East Campus, are not presently nor have they been in the past an organic part of the College of Agriculture/IANR. Rather they have been and are a part of the UNL Libraries, administered by a Dean of Libraries headquartered on the City Campus. The cooperation between the East Campus Library unit and the staff and students of the College of Agriculture/IANR has been excellent throughout the history of the Institution. The authors have no recollection of any College/IANR staff member ever voicing concern over the administrative structure.

Names of Unit

College of Agriculture Library	(NA)-1965
C. Y. Thompson Library, East Campus	1966-present

Administrators (all titled Librarian)

Edna C. Noble	1904-1946
Chester H. Linscheid	1946-1948
J. Richard Blanchard	1949-1951
Ralph H. Hopp	1951-1953
Sherwood Kirk	1953-1954
Wayne R. Collings	1954-1981
Lyle R. Schreiner	1981-present

Locations and Operations until 1964

In the early 1900's the College of Agriculture Library was in Experiment Station Hall (now the Agricultural Communications Building). Later it was moved to Agricultural Hall. In 1924 the Library consisted of about 20,000 volumes.

Correspondence in the 1930's and 1940's indicated a critical need for more space. In a letter of February 17, 1936 to Chancellor E. A. Burnett, University Librarian Gilbert Doane stated: "The Agricultural College Library is housed in three inadequate and crowded rooms in Agricultural Hall, from which students are actually turned away because of the small seating capacity."

In 1939 a large basement stack area was made available in Agricultural Hall with a connecting stairway to a second floor reading room. In the late 1940's the College of Agriculture library collection was housed in various areas of Agricultural Hall (three rooms on the south end of the second floor, the west basement stack area, a large room on the third floor and one-third of the attic). Because of the inadequacy of the library accommodations, several departmental collections were developed on the Agricultural Campus. There were also two major departmental libraries — the Entomology Library and the Animal Pathology Library.

Need and Plans for a New Building

It was obvious by the late 1940's that a new library was desperately needed on the Agricultural Campus to serve students in agriculture and home economics. It was fortunate that at that time the 60th Nebraska Legislature, faced with the large list of necessary buildings for the ten year period 1947-1957, passed the "State Institutional and Military Department Building Fund" which authorized a tax of one and one-tenth mills for building needs. A "Report of the University Building Committee to the Chancellor and Board of Regents" dated November 1, 1948 stated: "The major buildings needed during the next nine years on the Agriculture Campus are Agronomy, Agricultural Chemistry and Chemurgy, Agricultural College Library, and a classroom and laboratory building." The Agricultural College Library was low on the ten-year priority list, as it was scheduled tentatively for the 1955-56 fiscal year.

The first written program for the library was a 1949 thesis by Reginald E. Davies, a graduate student in the School of Architecture, entitled: "Proposed Administration and Library Building, College of Agriculture, University of Nebraska." This was followed in 1950 by "Preliminary Statement Prepared for the Architect of the College of Agriculture Library Building, the University of Nebraska", by J. Richard Blanchard. In 1952 Ralph H. Hopp prepared a 13-page statement titled "Proposed College of Agriculture Library Building, the University of Nebraska". Finally in April 1956 Wayne R. Collings prepared a "Preliminary Statement Concerning a Proposed Library Building, University of Nebraska, College of Agriculture".

At this stage the Ag Union was exploring all avenues for its building program. Serious thought was given to building a combined library and student union on the East Campus. As a result of these discussions, a 27-page statement "Proposed Ag Library and Union Combination" was prepared by the Ag Union Build-

[3]The authors gratefully acknowledge the contribution of Wayne R. Collings in the preparation of this portion of the book.

ing Committee in January 1959.

It was Dean W. V. Lambert's strong leadership and interest in the library that finally got the library building program underway. He used his influence to get the proposed library building on a higher priority. In 1956 he named a library building committee and in 1961 the University administration selected Clark and Enerson as architects for the new agricultural library.

The program and planning was done by Frank A. Lundy, Director of Libraries, Richard A. Farley, associate director, and Wayne R. Collings, librarian of the College of Agriculture and Home Economics. Intensive planning in weekly conferences over a period of months was a group effort by architects Lawrence A. Enerson and Albert C. Hamersky and librarians Lundy, Farley and Collings. In all of the early stages of planning, extensive use was made of Dean Lambert's faculty committee.

Becoming a Reality

The new library building was completed in the summer of 1964 and in the fall of that year all the agricultural library collections, dispersed on two campuses, were finally pulled together into one organized unit. At the time of the move in 1964 the collection comprised approximately 80,000 volumes. The library, dedicated January 8, 1966, was named the C. Y. Thompson Library in honor of Charles Yoder Thompson who had served on the Board of Regents for 24 years.

Important Developments and Recognition

In May 1949 a cooperative library service plan was started between the University of Nebraska and the U.S. Department of Agriculture Library. The USDA branch library in Lincoln was merged with the College of Agriculture Library. Under the terms of the agreement the College of Agriculture Library supplied free library service to USDA employees in a six-state area. In return, the USDA Library supplied free photocopying and reference service, sufficient funds for extra copies of publications and periodicals, and for the part time salary of an additional staff member for the library. This service was discontinued in 1958. However, in the 1970's the College library again entered into a cooperative arrangement with the National Agricultural Library in providing library service to USDA personnel in Nebraska. This service is continuing to the present time.

The 50 years, 1924 through 1974, saw a phenomenal growth in library development on the East Campus. The library emerged from inadequate, cramped quarters to a beautiful new building, so beautiful and functional that it won the 1964 Honor Award given by the Nebraska Architects Association, a Chapter of the American Institute of Architects. The collection grew from 20,000 volumes in 1924 to over 159,000 at the end of 1974. The C. Y. Thompson Library is recognized as one of the major agricultural libraries in the midwest.

As of the present time (1987), the collection has grown to 230,000 volumes. The pictures of the honorees of the Nebraska Hall of Agricultural Achievement are displayed on the main floor of the Library. One-third of the basement is occupied by the Biometrics and Information Center with computer terminals.

Nonacademic Services

An important, nonacademic segment of the UNL is Business and Finance, presently headed by Vice Chancellor John W. Goebel. This large unit consists of the following Divisions (each with a varying number of subunits): operations analysis; personnel, insurance and risk management; comptroller; budget officer; physical plant; business manager; and University police. The IANR cooperates closely with these Divisions and their respective subunits, and depends heavily on them for the various staff operations. The University is well and efficiently organized to carry out these many operations.

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